Modelling

Guide for Teachers and Students

Vol. I

E. Lanteri

THE ONTARIO COLLEGE OF ART
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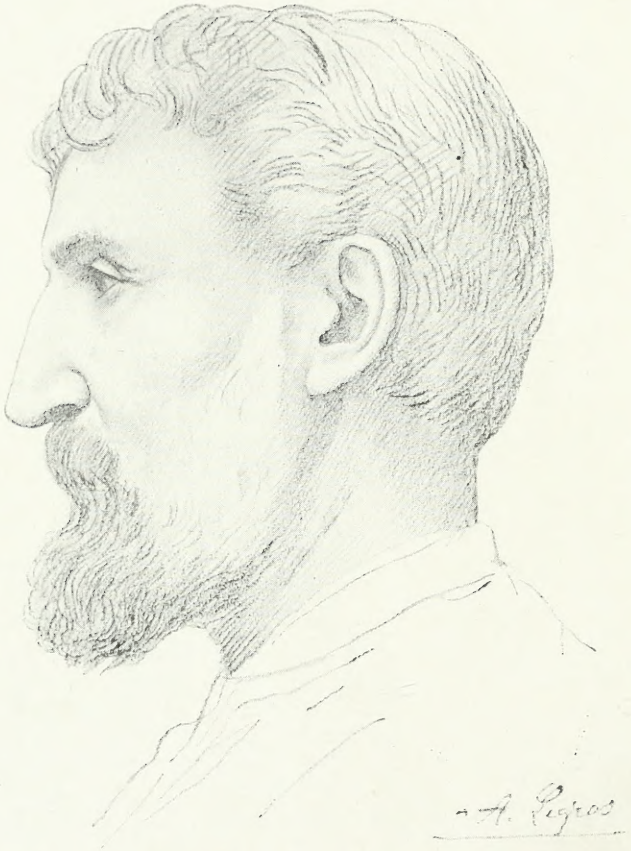
MODELLING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Modelling

A GUIDE FOR TEACHERS AND STUDENTS

BY

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WITH PREFACE BY

ONSLOW FORD, R.A.

WITH 42 FULL-PAGE PLATES AND NUMEROUS ILLUSTRATIONS AND DIAGRAMS

FRONTISPIECE:—PORTRAIT OF THE AUTHOR, BY PROF. A. LEGROS

LONDON:

CHAPMAN & HALL, Ltd.

11 HENRIETTA STREET, W.C.

1902

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RICHARD CLAY AND SONS, LIMITED,
LONDON AND BUNGAY.

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PREFACE

It would be difficult to overrate the value and excellence of this work.

Had such a book been obtainable when I was in the twenties, I would not have rested a moment until I possessed a copy, and when possessed of it, it would have been my constant companion.

Professor Lanteri has put in very comprehensive language everything that is needful for the young sculptor to know.

The result of the careful thought and observation of years is here set forth in a manner so clear that it may appear to some readers that after learning Professor Lanteri's book by heart, they will then know how to model. A careful study of this work will show that the author does not hold out any such vain hope.

The object of this work is to teach the student how to begin. Many things are clearly shown in the illustrations and

described in the text that would take some people many years to find out for themselves. The young student is plainly told how to begin, the more advanced student will find many doubts here cleared up, and the feelings, after reading the book, of all who make sculpture their life study, will be those of gratitude.

E. ONSLOW FORD.

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MODELLING

INTRODUCTION

I HAVE repeatedly been asked to publish the notes of which I made use for my demonstration-classes at the Royal College of Art.

I fancy that by somewhat developing them they will be found useful by those who intend to devote themselves to this art, as well as by those who undertake the task of instructing beginners in the subject.

I do not pretend to think that my method is the only right one—there is no such thing as an infallible method. Every intelligent teacher must be free to form his own, on condition that he bases it on true principles. Thus, instead of exclusively setting forth one method,—even if it be the very best,—it is better to state broadly the great essential principles of teaching, in which every method ought to be included, and to allow the teacher a certain latitude.

It is important that every one should bring to the adopted method such modifications as will allow him to consider it his very own personal method. It is only thus, that he will find the impulse and devotion necessary for the accomplishment of his arduous task.

The auxiliary means of teaching have not an absolute value in themselves,—they may prove useful or dangerous, according to the moment and measure of their application. In order to prove efficacious, they must be presented in methodical order. This order can only be settled after precisely ascertaining the object in view, and the principles on which the means for obtaining this object should be based.

Art is essentially *individual,* in fact "*Individuality*" makes the artist.

All teaching, to be true and rational, must aim at preserving, developing and perfecting the individual sentiment of the artist.

Therefore the end at which every teacher should aim, whose task it is to teach the Fine Arts, is the development of the artistic aptitude of each pupil. The best means and exercises are those which tend most surely to attain this end.

In thoroughly teaching each pupil the *craft*, not to say trade, of a sculptor, there is no fear of destroying his individuality; on the contrary, having conscientiously learnt the craft, he will gain confidence and the necessary power to express truthfully the personal sentiment with which Nature has

endowed him. Whilst, if the teacher wants to go further than this, he risks imposing on the student his own way of looking at things, and destroying the pupil's individuality.

This short attempt of mine has no other object than to place before the student some practical hints, based entirely on the anatomical construction of the human body, which construction is invariable in its principles. When he has mastered this method, he will come to apply it without thinking of it,—instinctively as it were, and without effort. The application of this method will have caused him to fix the points of construction precisely; he will have made a complete analysis of the human figure; all the causes and reasons of its various forms will be clear to him, and he will avoid that groping in the dark, those unreasoning alterations, which are always tried, when this branch of the instruction has been neglected.

This book contains in short limits the essence of the subject; it is, so to speak, the summary of a method, a sort of guide which gives the primary indications of the way.

I must insist again and again on this point, that the aim of Art-teaching should be to put within the pupil's grasp all that is necessary to help him to express his thoughts by the simplest, surest and quickest means. It should in particular sharpen his observation, without too much influencing his own judgment: and when the student's judgment goes astray, he should be corrected by model or example, placed before him without his

perceiving the intention,—for fear of making him lose his own power of judging.

And as *Drawing* is the principal foundation of *Sculpture*, and a good sculptural work depends largely on good drawing, the student should draw as much as, if not more than, a student of painting,—(which unfortunately is not always done). No student ought to be admitted to modelling in a school, unless he has first done some serious drawing; and on this understanding I begin this guide,—always addressing myself to a student who is capable of *seeing a line* and *executing it properly*.

Another important point on which I must insist, is the thorough study of *Artistic Anatomy*. You must begin your work with some knowledge of the form of the bones and muscles, and go on with the study of it while at work. I shall point out to you in the following pages what is necessary for you to study, but I can of course only slightly indicate it to you, leaving you to complete your knowledge from the actual *skeleton*, the *anatomical* figure, and the excellent books written on the subject of Artistic Anatomy by the late Professor Marshall, Professor A. Thompson, Mr. J. Sparkes, and others.

I beg you to observe that the knowledge of the bones is even more important than that of the muscular system; and do not lose sight of the fact, that "*Anatomy teaches you the general laws of the human form, whilst the living model shows you the same laws applied, and modified by individual characteristics.*"

PART I

PART I

TOOLS

(1) Provide yourself with two turntables,—one for the work, the other for the model, the height from the ground about 3 feet 4 inches to 3 feet 6 inches. See Fig. 1.

(2) Provide two wooden boards, about 18 inches square or larger, according to the size of your work. To avoid warping through the moist clay, have the boards clamped at the back with two battens nailed or screwed on crossways. See Fig. 2.

(3) A few wooden tools are enough to begin with, the preference to be given to those of simple form; avoid tools which are heavy in your hand, as well as the small and thin ones, unless your work is to be in very small proportions. One tool with strong wire curves at the extremities will be found helpful. For shapes see Fig. 3.

(4) Provide a pair of large iron compasses or callipers, with their legs slightly curved, and about 10 to 12 inches long. These are best ordered from a local blacksmith. Fig. 4.

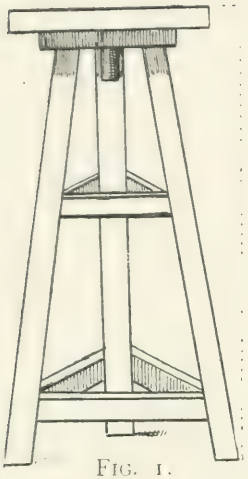
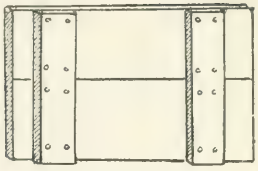


FIG. 1.



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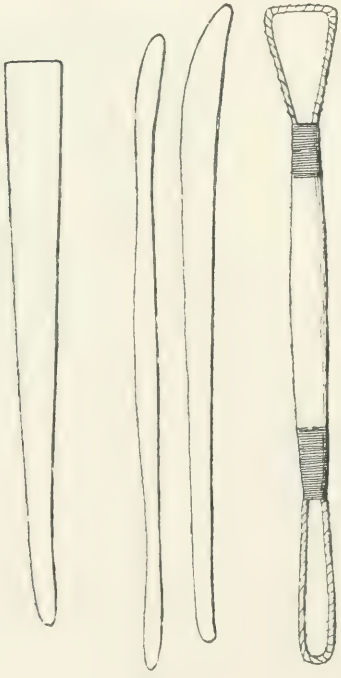


FIG. 3.

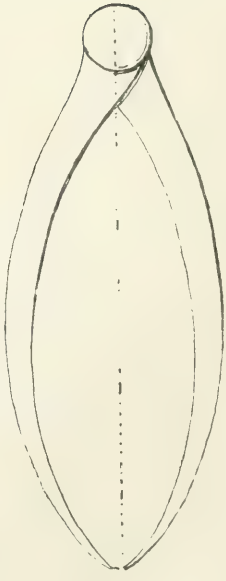


FIG. 4.

(5) Have at hand a small sponge to keep your fingers clean during modelling, and some soft old linen to cover up the work after leaving off for the day. Occasionally you will also require a fine syringe or a big brush to splash the clay, when it begins to harden. As we go on, I shall describe whatever tools become necessary ; at first no more than the above-mentioned are required.

FIRST STUDIES.—THE FEATURES

The Mouth

The best models for the details of the face I consider to be those taken from the mask of Michel-Angelo's "David." They are executed with such precision, so much knowledge of form and anatomy, that in copying them the student is seized with the desire to know the reason for these forms, and he is thus urged on to the study of Anatomy, so necessary for sculpture.

After having fixed your plaster cast on a board like the one you are going to work on, and having placed it on the turntable, fix both boards at the same angle by means of a wooden support, nailed to the board and turntable, (or by an iron support, screwed on to both), see Fig. 5, so that your work, as well as the plaster model, is in a vertical position. Then drive

a nail into your board, at about the level of your eyes. To this nail, by means of some wire (galvanised iron-wire will do, though copper-wire is preferable) fix a small wooden cross ("butterfly" in studio parlance—see Fig. 5), which will help to bear the weight of the clay. Then with your sponge wet the board and immediately rub some clay on the wetted part, so as to form a thickish paste to which your clay will adhere. If you neglect this, your clay will soon get loose from the board and drop down, but this paste and the butterfly will keep it in its place.

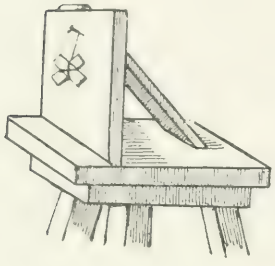


Fig. 5.

Let me just mention by the way, that the more you work the clay through with your hands, the more pliable and consequently the better it will be.

To begin work, lay a certain quantity of clay on your board, pressing it well in with the thumb, so as to give about the general shape and mass of your model, always taking care to keep a little below the actual amount, so that there will be no need to scrape off, but rather to add on, in order to arrive at the true form of the model.

Before beginning each study, you must try to understand what you wish to reproduce, and I shall, therefore, introduce each feature by a sketch of its characteristics and its anatomy.

FIG. 6. [*To face page* 11.

FIG. 7.

[*To face page* 11.

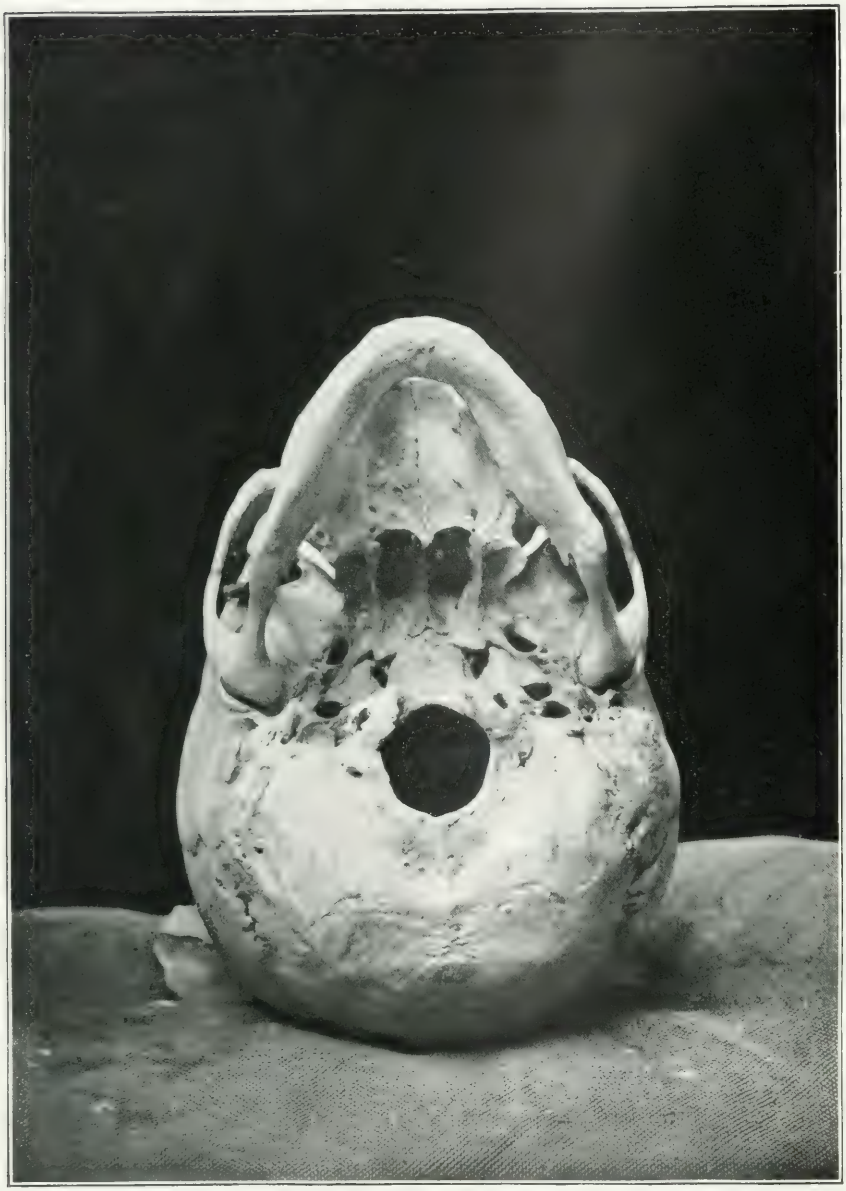


FIG. 8. [*To face page* 11.

The mouth is formed by the Upper and Lower Jaw; the upper jaw consists of the two *Superior Maxillary Bones*: they are two large bones, joined in the middle line and placed almost vertically beneath the Frontal Bone. By means of four processes —the *Malar*, *Alveolar*, *Palatine* and *Nasal Processes*, which extend in different directions, these bones are joined to the other bones of the face. The Malar processes connect them with the cheekbones. The Alveolar process forms the Superior Dental Arch, which contains the sockets for the Upper Teeth. The Palatine Process passes inwards to form the anterior part of the hard palate, and the Nasal Process extends upwards to the orbits and the Internal Angular Process of the Frontal Bone; it forms the sides of the nose and is connected with the Nasal Bone in front, its outer border forming the deep notch which constitutes the anterior opening of the nose.

The *Lower Jaw Bone* or *Mandible* is originally composed of two halves which very early become a single bone, *i.e.*, the *Inferior Maxillary*. It consists of a solid, horseshoe-shaped body, and upturned, flattened ends, the *Rami* or *Branches*. See Photograph of Skull, Figs. 6, 7 and 8.

The posterior border of each ramus expands into an oblong condyle which fits into the *Glenoid Cavity* of the *Temporal* bone and forms the *Temporo-maxillary Articulation*, a very secure double-hinged joint, which allows backward and forward, as well as lateral movement of the lower jaw. The junction of the

body of the bone and the Rami forms a rounded angle, which really decides the width and shape of the cheek. Apart from individual varieties, the angle is more acute in the fully developed individual than in the child, or again in an old man, where it is obtuse. See Figs. 9, 10 and 11.

Fig. 9.

Fig. 10.

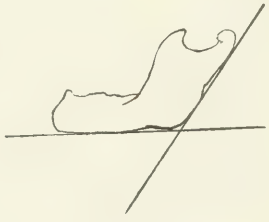


Fig. 11.

In the same way the Alveolar Processes are not so prominent in a child as in a full-grown person; and in old age, when the teeth fall out, these processes become absorbed and disappear.

There are various processes and ridges on this bone, which serve as attachment to powerful muscles; most important for our purpose is the triangular *Mental Eminence*, or Chin, which is subcutaneous, and therefore of great service for taking measures from, besides its being a very characteristic feature in the human face. Above it is the *Symphysis*, a vertical line which marks the union of the two Maxillary bones.

The transverse line which we specially designate by the name of Mouth is surrounded by the lips, which in their

turn are surrounded by the *Labial* group of muscles. These are :—

(*a*) The *Levator of the Upper Lip*, which raises it and draws it forwards ;

(*b*) The *Levator of the Angle*, which raises the outer part of the Upper Lip ;

(*c*) The *Zygomaticus Major*, which draws the corner backwards and upwards, and is a laughing muscle ;

(*a*) The *Zygomaticus Minor*, which draws the outer part of the upper lip in an upward, outward, and backward direction ;

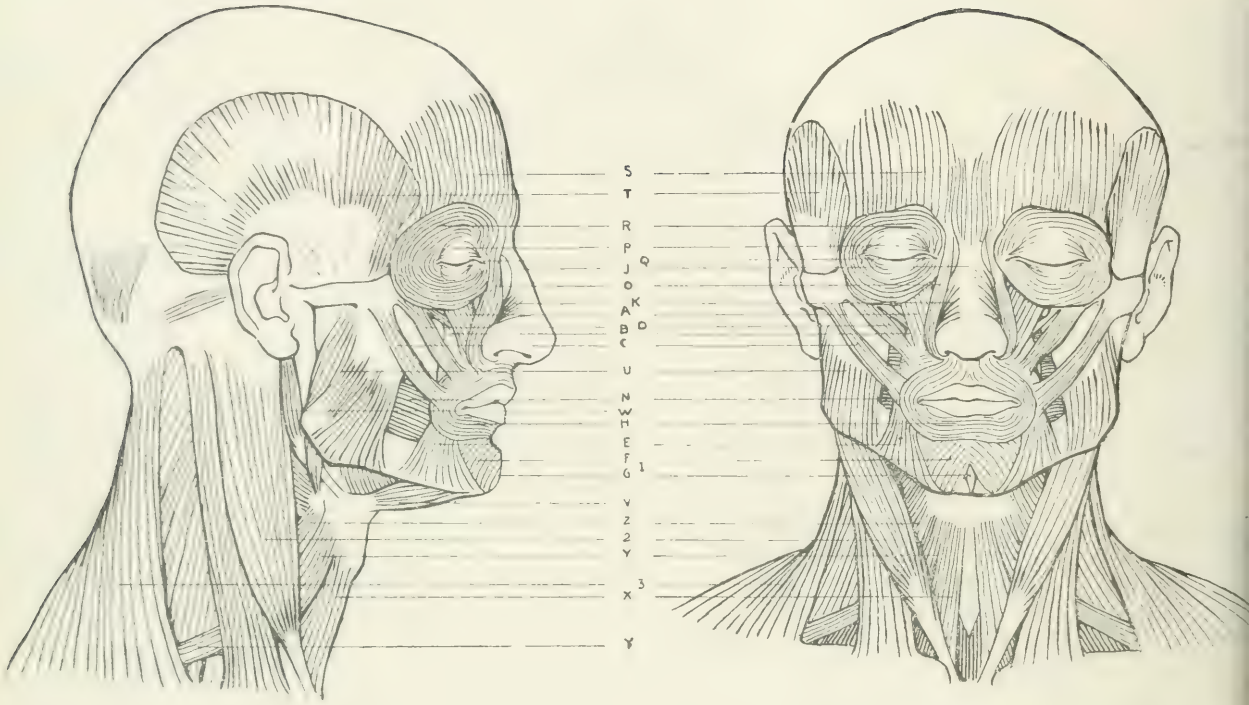
(*e*) The *Depressor of the Angle*, which draws the corner of the mouth downwards and backwards and assists in producing a sad expression ;

(*f*) The *Depressor of the Lower Lip*, which draws the lower Lip down ;

(*g*) The *Levator of the Lower Lip*, used in raising it and protruding it ; and last—not least

(*h*) The *Orbicularis Oris*, which surrounds the mouth and which forms the Lips. On the upper lip it forms a vertical *Median Furrow*, the ridges of which form the inner borders of two long triangular spaces, the other two sides of these being formed by the free border of the upper lip and the naso-labial line descending from the wings of the nose to the corner of the mouth. Figs. 12 and 13.

The Median Furrow ends in the prominent *Median Lobe* of



FIGS. 12 AND 13.—MUSCLES OF THE FACE AND NECK.

A. The Levator of the Upper Lip.
B. The Levator of the Angle.
C. The Zygomaticus Major.
D. The Zygomaticus Minor.
E. The Depressor of the Angle.
F. The Depressor of the Lower Lip.
G. The Levator of the Lower Lip.
H. The Orbicularis Oris.
I. The Pyramidalis Nasi.
K. The Compressor of the Wings.
N. The Buccinator.
O. The Common Levator of the Upper Lip and Nose.
P. The Levator of the Upper Lip.
Q. The Tensor of the Lids.
R. The Orbicularis Palpebrarum.
S. The Occipito Frontalis.
T. The Temporalis.
U. The Masseter.
V. The Digastricus.
W. The Digastricus.
X. The Sterno-hyoideus.
Y. The Omo-hyoideus.
Z. The Thyro-hyoideus.
1. The Stylo-hyoideus.
2. The Sterno-cleido Mastoideus.
3. The Trapezius.
4.
5.
6.

the upper lip; at its sides are slight depressions beyond which the lips are carried on by a convex form to the corners. The lower lip has no median projection, but there is a *median depression* from which two convex forms start towards the angle of the mouth, where the upper and lower lips join. The skin which covers this red border of the lips is closely adherent. From the fact of there being no cartilaginous framework in the lips, they are very flexible and lend themselves to the most varied expressions.

There is another small surface-muscle, called specially *Risorius* or *Laughing* Muscle, which acts together with the *Zygomaticus Major*, to produce a laughing expression. See Figs. 12 and 13.

After having well mastered the anatomical characteristics, and having laid on your board a certain quantity of clay, draw on this mass a horizontal line to represent the division of the lips; then with your callipers measure the distance from corner to corner of the mouth, and set this distance off on your horizontal line. Turn your board and the plaster model sideways, and work in profile—with small balls of clay—the outline of the middle with its projections and depressions; do the same from the opposite side-view; then stand in front of the work, and with the work executed from the profile as your guide, fill in the rest,—always keeping slightly below the volume.

You may then at once apply your anatomical knowledge, and lay the superficial muscles on in separate, well-defined strips, rather exaggerating their form than drawing them with indecision. See *Photograph* of mouth in three stages, Figs. 14, 15 and 16.

And now you ought to proceed by section,—that is, by studying your work from below and above,—taking good care that you look at your model and your work from the same point of view, from below and above, so as to compare them and try to obtain the same contours from these points of view. Thus you will correct what you have done so far.

Then look at your work and the model from a three-quarter view, and correct it from that point of view.

Having worked your masses well together from these different points, you proceed to work by light and shade and the numerous half-shades: this I call *Colour*, and I shall use the expression "colour" in this work entirely in the sense of *light and shade.* You must be careful to place your work in the same effect of light as the model, and in a strongly projected light from the side, which will give you a greater variety of shades than a light from the front,—in the latter, numerous small depressions pass unobserved, so that the result would be a surface without life and movement.

With the help of this working by colour, and by frequently turning the work and model so as to gain different effects, and

FIG. 14.

FIG. 15.

FIG. 16.

different points of view for your drawing, you will at last arrive at the simple form of your model. In short, you must always correct your work by drawing, and must try to obtain simplicity by colour, and expression by your knowledge of the form. Observe that work done in a side-light will always look well when turned to the front; whilst, on the other hand, work done in full light will from a side-view look uneven and undecided in its planes.

Take care not to use the tool too much; it will prevent you from acquiring suppleness of the hand and from developing a fine touch. The human finger, more firm and sure than the wooden tool, will best transmit the intentions of the artist, and express them in varied degrees; the finger is an intelligent, energetic, I might almost say an intellectual, instrument, and you must always use it wherever you can get it in, and only use the wooden tool in places where the finger cannot get in.

Second Feature.—The Nose

The nose is formed partly by *bone* and partly by *cartilage*. The two elongated *Nasal Bones*, joined to the Cranium just below the *Glabella*, form the bridge of the nose, and are supported at the sides by the ascending processes of the Superior Maxillary; to their anterior border are attached the *Lateral Cartilages* of the nose. There are five principal cartilages, an

upper and a lower Lateral cartilage on each side, and a median one between the two halves of the nose. See Figs. 6 and 7, page 11, and Fig. 12, page 14.

The lower lateral cartilages support the wings of the nose. There is a vast difference in the shape of the nose in races and in individuals, owing to variety of form in the arch, as well as in the cartilage. The muscles but slightly conceal the shape of the bone. The principal muscles from the artist's point of view are :

(*i*) The *Pyramidalis Nasi*, which is really only a continuation of the big Frontal muscle ;

(*k*) The *Compressor of the Wings*, which envelops the sides of the nose below the previous muscle ;

(*l* and *m*) The very diminutive *Anterior* and *Posterior Dilators of the Nose*, at the side of the nose, and hardly visible ;

(*n*) The *Depressors of the Wings of the Nose ;* and

(*o*) The *common Levator of the Upper Lip and Nose.* Refer to Figs. 12 and 13, page 14.

When you have well studied the position and characteristics of these bones and muscles, erect your board in the same way (vertically) by the side of your model. To give the better support to your work, make a *small* butterfly, which ought to be inside the most projecting part of the nose, taking care to make it sufficiently small, so as not to allow the ends to show or stick out of your finished work.

FIG. 17. [To face page 13.

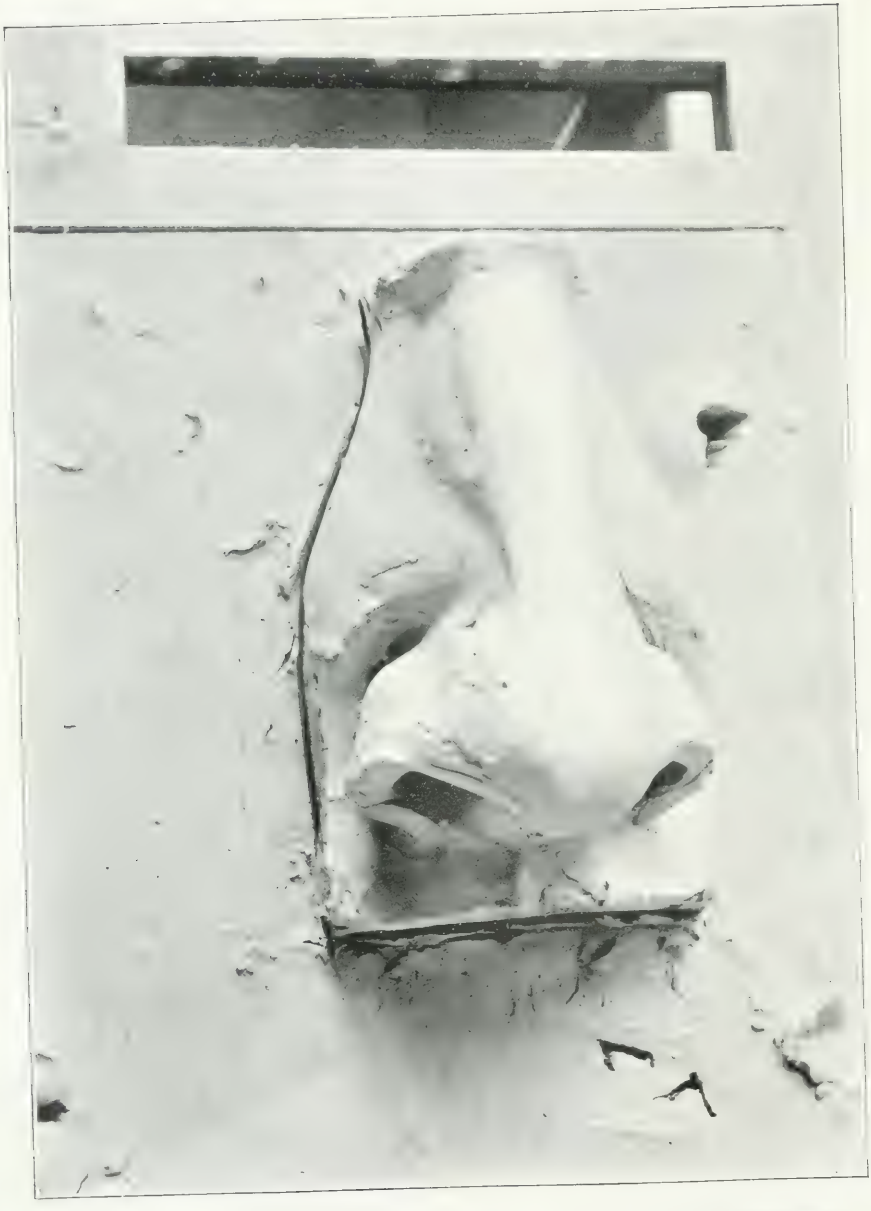


FIG. 18.

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FIG. 19. [*To face page* 19.

Proceed then in the same way as for the beginning of the previous feature, *i.e.* moisten your board, make a clay paste on it, and let me say, once for all, that this has *always* to be done on starting modelling on a background. Having put on a sufficient mass of clay to cover the cross and give the size of your model, you measure with callipers the length of the nose, and at once start to work the profile, first from one side, then from the other, then from below and above, to get the outlines of wings and nostrils sharply indicated; then you take the three-quarter views, and at last the colour, in a side-light, thus modelling and drawing alternately from every point of view, to correct your work wherever you see a mistake, until it is satisfactory. I would particularly warn you not to round off too much the tip of the nose, but well show the planes. See Figs. 17, 18, and 19.

Third Feature.—The Ear

For our purpose the outer ear, or *Auricle*, is all that is needful, whilst the Anatomist proper has to study carefully also the parts of the ear hidden from view.

We have to examine in the Auricle the external and the internal face, and observe that the *depressions* of one side are the *protuberances* of the other.

The framework of this feature consists not of bone, but of

cartilage, much turned and twisted, which descends right into the Ear-Passage, where it is attached to the bony structure of the skull; the cartilage does not descend into the lobe of the ear, which is made up of areolar and fatty tissue.

The outer curved rim of the ear is called the "*Helix*"; it is generally more or less folded over at the upper part; within this curve, and parallel to it, is the shorter curve of the *Anti-helix*, a ridge which surrounds the deep *Shell* or *Concha*, that leads into the Ear-Passage or *Auditory Meatus*. Its upper part branches off into two ridges between which lies a small Fossa, which loses itself under the overlapping part of the Helix.

In front of the Concha, protecting, as it were, the opening into the ear, is the *Tragus*, presenting a convex form to the outside. Immediately behind its lower part is a deep notch (—the point from which we take our measures for the face—), behind which rises another protuberance, called the *Antitragus*, and below it extends the *Lobule* or *Lobe* of the ear. The muscles which lie on the Tragus and Helix are very insignificant, even the three Auricular muscles, which fix the ear to the skull, are so small and thin, that they hardly influence the surface-form. The ear is covered with a fine and smooth skin, which closely follows all the depressions and projections of the cartilaginous framework. (Fig. 20.)

The process of working will be the same as indicated for the

FIG. 21.

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FIG. 22

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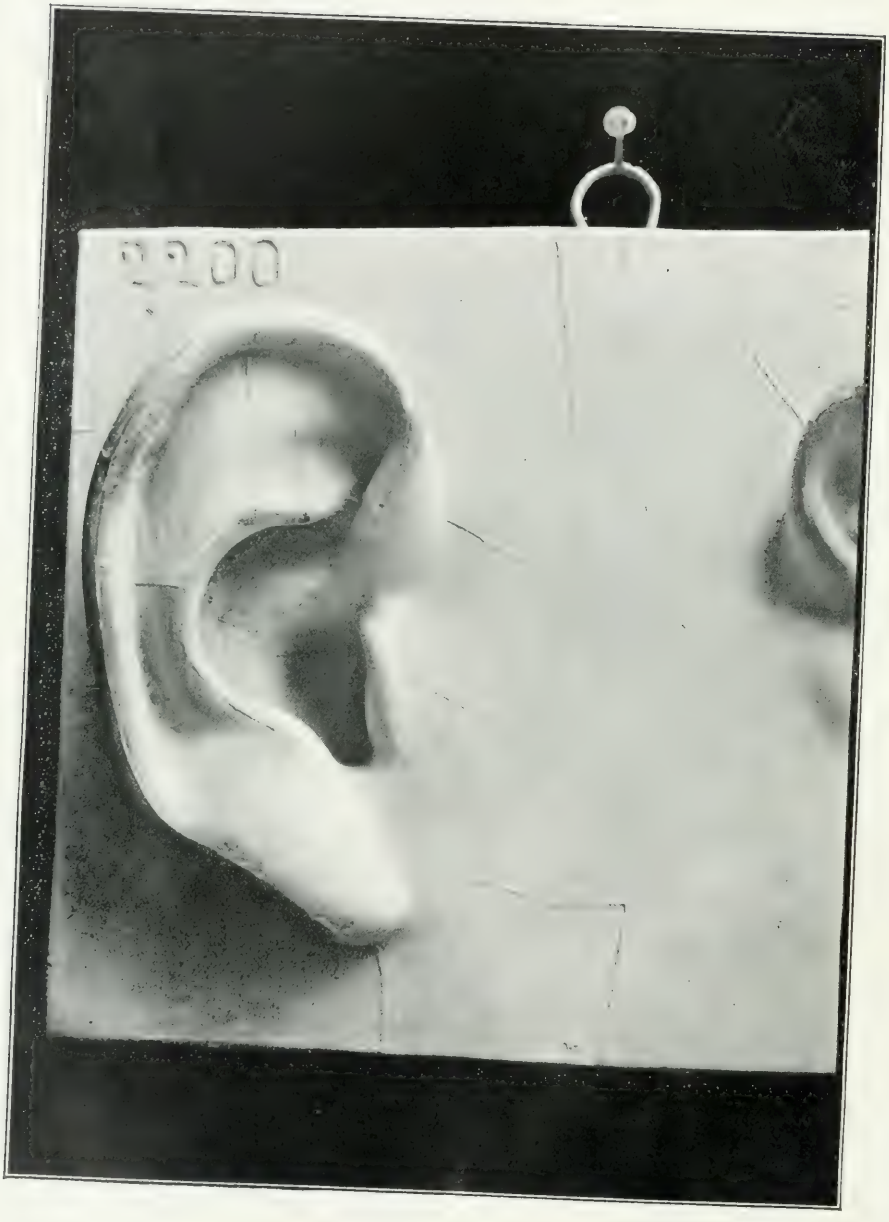


FIG. 23.

[To face page 21.

previous studies; only let me repeat that the principle of drawing and working by colour-effect is the only principle I shall insist upon for all our studies, whether they be from the cast or from nature. That is why a modelling-student must above all be a good draughtsman, for drawing will give him not only precision in the form, but it is also the only means of making his work graceful and telling,—a quality of work which can never be obtained by him who cannot draw, and whose work will always remain heavy and commonplace. Therefore when you have understood the why and wherefore of each form, and know it by heart, drawing will remain the most important part of your work. See Figs. 21, 22, and 23.

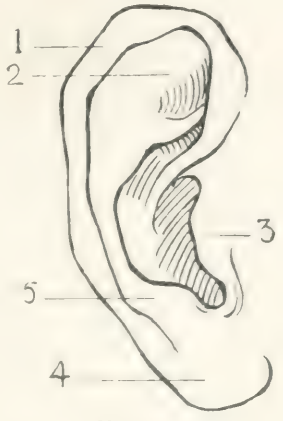


Fig. 20.

1. Helix.
2. Concha.
3. Tragus.
5. Antitragus.

Fourth Feature.—The Eye

The eye lies in the socket, called *Orbit*, which is formed by various bones.

The Frontal Bone forms the roof of the cavity itself, its upper border, on which the *Supra-Orbital Ridge* and the *Superciliary Eminence* are well defined. Where the Supra-

Orbital Ridge terminates, in the *External Angular Processes*, the Malar Bone continues the outer wall and part of the lower border of the Orbit, which is completed by the Nasal Process of the Upper Jaw-bone. See Figs. 6 and 7, page 11.

The shape which the orbit presents in the skull is a somewhat irregular rectangle, within which rests the Eye-Ball or *Globe* of the Eye, held in its place by the four straight and the two oblique muscles of the eye-ball, which are entirely hidden from view; they surround the Optic Nerve, and only interest us on account of the influence they exercise on the movements of the eye-ball. They *rotate* the eye-ball, moving it respectively outwards, inwards, upwards, or downwards.

The Globe of the Eye consists of a large sphere, the opaque white *Sclerotic*, and the segment of a smaller sphere in front of it, corresponding with the round, transparent, and prominent *Cornea*.

Through the Cornea we see the *Iris*, having in its centre the round opening of the *Pupil*, which shows as a black spot and admits the light into the interior of the eye. I dare say you have all observed its faculty of contracting in a strong light and dilating in a diffused light; and that occasionally the size varies on the right and left of the same person.

The eye-ball lies with the greatest ease in the ample socket, being surrounded by a larger or lesser quantity of fatty tissue, on which it rests and which fills the empty spaces and corners

of the hole. The connection with the eye-lids is managed in front under their surface by a very loose *mucous membrane*, which allows the lid to move easily over the eye-ball. The muscles of the eye, which to some extent affect the surface, and therefore our work, form—

The *Palpebral* Group ; these consist of—

The *Levator of the Upper Lid*,

The *Tensor of the Lid*, and

The *Orbicularis Palpebrarum*.

The *Eye-lids*, *Palpebræ*, or *Tarsi*, are supported by thin fibro-cartilage ; its outer border constitutes the margin of the lid, and causes the comparatively flattened, thick edge of the lids. At the *outer corner* the junction of upper and lower lids forms an *acute* angle ; not so at the *inner corner*, where the small *Lacrymal Fossa* interrupts them. This *Lacrymal Fossa*, into which the *Lacrymal canals*, coming from the tear-bag, empty themselves, and which slants towards the nose, contains a small pink elevation, the *Caruncle*. The skin covering the eye-lids is very thin and contains no fat.

The *Levator of the Upper Lid* is rather deep-lying within the orbit, and is hidden by the *Orbicularis* muscle.

The *Tensor of the Lid* draws it inwards, and appears almost to be a deep-lying part of the *Orbicularis*. This latter, a thin, broad, elliptical sheet of muscular fasciculi, by its *palpebral* portion covers the lids, and by its *orbital* portion covers the

margin of the orbits ; it is slightly attached to the Malar Bone at one point, and its fibres blend with those of the surrounding muscles of the forehead, cheek, and occasionally with those of a nasal muscle.

Its action is to close the eye for sleep as well as in various emotions, and in closing the lid it moves the outer angle of the opening towards the inner. The inner angle, being held in place by the *Tendo Oculi*, does not move appreciably ; it is therefore a useful point for us to measure from. See Figs. 12 and 13.

The Orbital part of this muscle has a great effect on the skin of the surrounding parts of the face, and its contracting action causes the wrinkles and folds of the skin at the outer corner of the eye. You will have to study its action very carefully from your Anatomy-books, and from your own face with the help of the looking-glass. I can here do no more than give you a hint what to look for. The late Dr. Bellamy, in his lectures at South Kensington, used always to impress on his Anatomy students that they carried their own skeleton about with them. I beg to repeat this, and to point out to you that study before the looking-glass will reveal and make clear to you anatomical details, such as your unaided eye can hardly see in the model. See Figs. 24, 25, and 26.

Fig. 24.

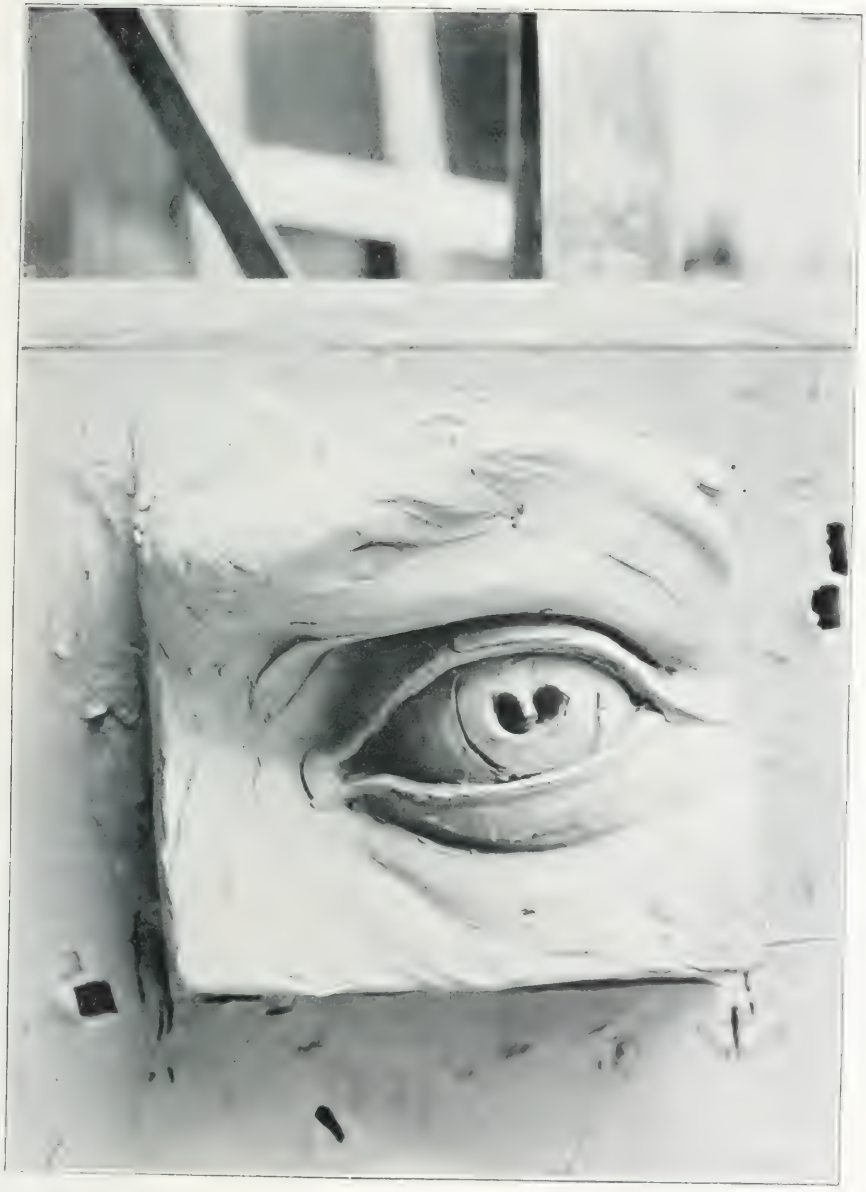


FIG. 25.

FIG. 26.

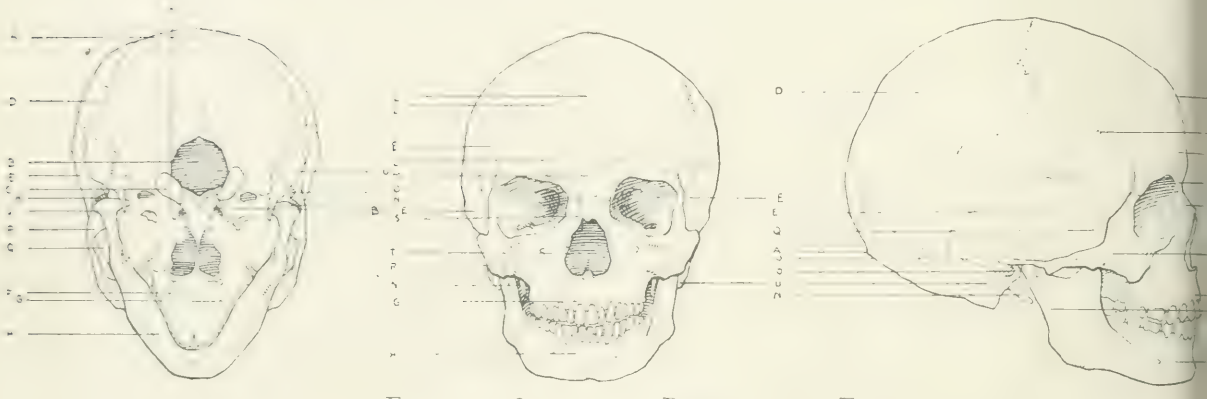
(To face page 24.

THE HEAD

The Skull, or bony part of the Head, consists of two distinct parts, the *Cranium* and the *Face*, each part being again composed of several bones. On comparing several skulls with each other, we notice great variety in their development; some are more developed in front and above, others more at the back, others, have their development in breadth. If you take the oval-shaped "Foramen Magnum" as a point of centre, and compare the extension of the skull in front and at the back of it (see Figs. 27, 28, and 29, you may take it as a general rule, that, (—in races and in individuals), where the back portion of the cranium is of larger extent, the instincts predominate over mental capacities; and, *vice versâ*, where the forehead and upper part of the skull are more developed, mental faculties predominate over instincts. In the African, *e.g.*, you see the forehead receding and the Occiput largely projecting, as if it must balance the projecting chin; in the European, on the contrary, you see the Facial Line almost vertical, and but little projection at the Occiput. When you have a chance of observing the skulls of different nations,

races, and individuals, I would advise you to compare carefully and to take notes of their diversity, as I have not time to do more than direct your attention to the great variety in the subject.

The skull consists of several bones articulated by the



FIGS. 27, 28, AND 29.—BONES OF THE FACE.

A. Occipital.
B. Foramen Magnum. B'. Basilar process.
C. Occipital Condyle.
D. Parietal.
E. { E. Temporal. E'. Temporal Ridge. E''. Squamous Portion. E'''. Petrous.
F. Palatine.
G. Alveolar. Upper Jaw-bone.
H. Lower Jaw-bone. H'. Ramus of Jaw-bone.
J. Glenoid Cavity.
I. { L. Frontal. L'. Frontal Eminence. L''. Superciliary Eminence.
M. Glabella.
N. Styloid Process.
O. Auditory Foramen.
P. Zygoma.
Q. Sphenoid.
R. Malar.
S. Nasal.
T. Ethmoid.
U. Mastoid.

Sutures which belong to the *immovable joints.* In some of these Sutures the edges of the bones are *serrated,* in others they are *bevelled* and *overlapping*, others are deeply *indented;* in short, there is a great variety in their articulations, and

no movement can occur at these joints; yet they allow of continuous growth of the bones, for a thin layer of fibrous membrane intervenes between bone and bone. The sutures become *osseous* in old age. When they unfortunately become so in young children, the brain can no longer expand, and the result is *idiotcy*.

The bones forming the outer surface of the Cranium are :—

The *Occipital*,
The two *Parietal*,
The *Frontal*,
The two *Temporal*,
The *Sphenoid*, and
The *Ethmoid* bones.

The four first-mentioned are the larger ones.

The *Occipital* bone, or *Occiput*, is the lowest and hindmost bone of the Cranium, by which the head is joined to the neck. It is convex to the exterior; its lower part contains the opening, called *Foramen Magnum*, through which the *Spinal Cord* passes down from the brain; on the right and left of this opening are the *Occipital Condyles*, which fit into the articulation of the *Atlas vertebra*, and are so arranged as to allow facility of movement with great security. The part anterior to the Foramen Magnum, called the *Basilar Process*, is joined to the *Sphenoid Bone*; the part posterior to it forms the *Occipital Protuberance* (see Fig. of skull) which gives attachment to the *Ligamentum Nuchæ*,

the *Trapezius* muscle and to the *Occipito-Frontalis* muscle. This is the most projecting part of the back, and also the thickest part of the bone.

As the Occiput forms the back and base of the Cranium, the *Parietal Bones* form its sides and summit; the wall being continued forward by the *Frontal Bone*, which constitutes the upper part of the face, the *Forehead;* it forms the root of the nose and the upper border and inner roof of the Orbits, and part of the base of the Cranium, which is completed by the Sphenoid and Ethmoid bones; but as these latter hardly come to the surface, with which our work is concerned, I only mention them.

The *Frontal Bone* shows various eminences, ridges, and processes, which you must study on the dried skull as well as on the living model. On each side of the forehead you see above the Temples the *Temporal Ridges*, which limit the Temporal Fossæ and lose themselves at the back behind the ear, and in front terminate at the *External Angular Processes* (which join the Malar bones below). From these external angular processes start in an inward direction the *Supra-Orbital Ridges*, which form the upper margin of the orbits, and are continued to the root of the nose, which produces more or less the indentation that you observe in the profile. The smooth, broad part of the frontal bone above this indentation is called the *Glabella;* on

each side of it you observe the *Nasal Eminence*, from which the *Superciliary Eminence* starts in a slightly curved ridge. The space between the Superciliary Eminence and the Supra-Orbital Ridge contains the *Frontal Sinus*. This Sinus consists of an air-space between the outer and inner layers or *tables* of the bone, and, by means of a corresponding sinus in the Ethmoid bone, this air-space communicates with the nose. These sinuses evidently serve to increase the anterior part of the base of the Cranium ; they do not exist in childhood, are smaller in women than in men, and diminish in old age. They do not, as is often supposed, indicate an extra development of the cerebrum, but probably give resonance to the voice.

Above the superciliary ridges, and separated from them by a depression or furrow, we find the *Frontal Eminences*, and between them in the Median Line a vertical ridge, indicating that in early life the Frontal Bone consisted of two halves.

The two Temporal Bones occupy a semicircular space on the sides of the Cranium, between the Occipital, Parietal, and Sphenoid bones. They are somewhat complicated in shape, consisting of four portions, the *Petrous*, *Squamous*, *Mastoid*, and *Zygomatic* portions, which meet round the ear-passage. The wedge-shaped *Petrous* portion, containing the organ of hearing, fits into the base of the skull ; from the side of the *Auditory Meatus* the *Styloid Process* projects into the neck, there to serve as attachment to several muscles and ligaments.

The *Squamous* portion of the Temporal Bone occupies the space above the ear and most of the Temporal Fossæ. The space behind the ear is taken by the *Mastoid* portion with its large *Mastoid Process*. This latter is filled with air-cells, which assist the organ of hearing. To the surface of the process various muscles are attached. It is small in children and largest in the male sex. In front of the ear there extends in a forward direction the fourth portion of the *Temporal Bone*, the *Zygomatic Arch*, which is joined in front to the posterior part of the *Malar Bone*; beneath it and protected by it, the *Temporal Muscle* and the great blood-vessels pass freely; to its lower border the *Masseter Muscle* is attached. The *Zygoma* at its base is attached to the *Squamous Portion* of the bone by three ridges, two of which pass inwards, and form the *Glenoid* cavity, into which the condyle of the lower *Maxillary* is articulated.

The *Sphenoid Bone*, a single bone which is wedged in and touches all the other bones of the Cranium, is hidden from view. Its body completes the base of the skull, supports the *Septum*, completes the *Orbital Sockets*, and by two extended processes fills in the space in the *Temporal Fossæ* between the Frontal, Temporal, and Parietal bones.

The *Ethmoid Bone*, also a single bone, completes the base of the Cranium between the Sphenoid and Frontal bones. It is like the former bone, more interesting to the anatomist than to the artist, as it nowhere comes to the surface in the living form.

Of the bones of the face, only the *Malar* bones, the superior *Maxillary*, the *Nasal* bones, and the *Lower Jaw-bones* show on the outer surface. The *Malar* bones are the two thick quadrangular bones clearly discernible in the face. The body of the bone sends out three processes, the longest of which, the superior or *Frontal* process, joins the *External Angular* process of the frontal bone, and completes the outer border of the orbit; the *Posterior* or *Zygomatic* process completes the *Zygomatic Arch*, the *Anterior* or *Maxillary* process lies on the upper jaw-bone and helps to form the lower margin of the orbit; the deeper parts of the *Malar* join the superior *Maxillary*, *Sphenoid*, and *Frontal* bones.

As for the Jaw-bones and Nasal bones, I beg to refer you to pages 11 and 12, where I have already given you a sketch of them, for the features of mouth and nose.

Muscles of the Head

Refer to Figs. 12 and 13, page 14. We may divide these muscles in groups under two heads:—Muscles with *Osseous attachments*, *i.e.*, which are attached to the skeleton both at their origin and insertion, and *Cutaneous Muscles*, one end of which is attached to the *Fascia* under the skin; or more conveniently into seven groups: *Masticatory*, *Epicranial*, *Auricular*, *Orbital*, *Palpebral*, *Nasal*, and *Labial*.

The MASTICATORY *Group of Muscles.*

To these belong—

The *Temporal*,

The *Masseter*,

The *External Pterygoid*,

The *Internal Pterygoid*, and

The *Buccinator Muscles.* (Refer to Figs. 12 and 13.)

The *Temporal* is a fan-shaped muscle, originating above the *Temporal Fossa* and the surface of the *Temporal Fascia;* it narrows as it passes underneath the *Zygomatic Arch* into a broad, strong tendon, and is inserted at the *Coronoid* process of the lower *Maxillary*.

The *Temporal* is the strongest of the Masticatories.

Function :—It draws the lower jaw upwards to close the teeth, and also backwards when it protrudes. It is superficial above, but deep-seated lower down. The direction of the *Muscular Fibres* is converging to the tendon.

The *Masseter* is a thick, quadrangular muscle on the lower part of the face. It is attached at its origin to the lower border of the *Zygomatic Arch*, and below to the *Ramus* and *angle* of the lower jaw and the *Coronoid* process. The direction of the fibres is oblique downwards and forwards for the lower layer, and oblique backwards for the upper layer.

Function :—It elevates the lower jaw, draws it forwards and sideways.

The *Pterygoids.* Both the external and internal *Pterygoids* come nowhere to the surface; they are deep-seated. The internal *Pterygoid* passes from the *palate* and *sphenoid* bones to the inner surface of the *Ramus* of the lower Maxillary; the external *Pterygoid*, overlying the former, passes from the Sphenoid to the front of the *neck of the lower jaw.*

Function :—The internal *Pterygoid* assists the action of the *Masseter;* the external *Pterygoid* protrudes the jaw and chin.

The *Buccinator*, or trumpeter's muscle, is a flat, quadrilateral muscle, covered behind by the *Masseter*, but coming to the surface, and filling up the hollow between the *Masseter* and the *Depressor of the angles* of the mouth and below the *Zygomatic Major.*

Function :—It retains the food between the teeth during mastication; it serves, when the cheeks are inflated with air, to expel the air through the lips, and thus justifies its name of trumpeter's muscle.

The Epicranial *Group.*

This consists of the *two Scalp Muscles and the Corrugator of the Eyebrow.* The two *Scalp Muscles*, the *Occipital* and *Frontal*, are joined into one muscle by the *Epicranial Aponeurosis*, and named the *Occipito-Frontalis* muscle. (Muscles joined like that

—or should I say separated?—by a transverse *Aponeurosis* are called *Digastric* muscles.)

The *Occipital Portion* is attached to the outer two-thirds of the superior curved line of the *Occiput* and to the *Mastoid Process.*

The *Frontal Portion* is attached to the external angular process of the frontal bone, and to the nasal bone (I have already pointed out on page 18 that the *Pyramidalis nasi* appears to be a continuation of the frontal muscle). Between these two bony points of attachment, the *Fasciculi* of the *Frontalis* mingle with those of the *Orbicularis* and the *Corrugator* muscles. Both portions of the scalp muscle are broad and thin; of the same breadth, but longer than either is the connecting *Aponeurosis*, which covers the summit of the Cranium.

Function:—The occipital portion draws the scalp backwards; the frontal portion elevates the eyebrows and causes the transverse wrinkles on the forehead.

The *Corrugator Supercilis* is a small deep muscle covered by the *Orbicularis Palpebrarum.* It exercises considerable control over the frontal muscle by drawing the middle of the eyebrow downwards and inwards, and thus *corrugating* the forehead, as its name implies—that is, causing the vertical folds in the middle, which express suffering or frowning.

The *Eyebrow* itself consists of fatty tissue mixed with muscular fibres, and it contains the roots of the hairs. Observe

the directions in which these grow and the arch they form.

I need not again indicate the muscles of the *Auricular*, *Ocular*, *Palpebral*, and *Labial* Groups, as I have drawn your attention to them in describing the different features; and besides— let me say it again—in mentioning anatomical features, my aim is not to write an anatomical work proper, but to prepare you for the anatomical lectures you ought to attend; or, failing that, if lectures are not available, the special books on Artistic Anatomy. You ought to work particularly with the bones in hand, as, for sculpture, *Osteology*, or the science of bones, is of still greater importance than *Myology*, or the science of muscles.

Thus in giving you later on an outline of the skeleton, I shall do so in order to point out to you those places where the *movement* takes place, *i.e.* where you have to look for it when you are face to face with the model.

PART II

PART II

THE BUST

Before beginning the study of a head from Nature, it is necessary that the student should copy at least two busts from the plaster-cast, such as the head of Lucius Verus (Græco-Roman) and The Lawyer (see photograph of bust in three stages, published by Chapman and Hall) by Donatello, or the Laughing Faun (bust from the antique). In the same way as the features taken from Michel-Angelo's David, these three busts possess all the qualities desirable for the study of form. The anatomy in them is so clear, the division of masses so plain, that with a little reflection the student easily understands what each form is meant to express. As far as construction goes, they are perfect; in short, they are splendid busts, the study of which can only elevate the taste of the student. No doubt, in choosing these models for the first studies from the round, I differ from a great many teachers, but in my opinion one should not give beginners examples to copy, the qualities of which consist in the beauty of style, qualities which a beginner cannot understand, or at

least cannot appreciate at their full value. Our taste is only formed in the course of time, and only after a succession of serious studies do we arrive at the true appreciation of those master-pieces, and can learn from them. The great apparent simplicity of antique statues has suggested the idea of giving them as copies to beginners. But these at first sight simple contours are in reality refined to such delicacy and so exactly correct, that the least deviation by the student who copies them utterly spoils them.

And as to the admirable modelling of these antique statues, why, there is nothing in the world so difficult as to render these learned simplifications and this exquisite delicacy. We should leave to these inimitable works their true and superior task of instructing by example. Let us have them reproduced by casts taken from them direct, and place these casts to be studied and admired before young artists, when they are capable of understanding the lesson they teach!

If we put before a beginner a head, the beauty of which consists only in style, where the construction is slightly neglected, where the anatomy and mechanism are not evident, he will only see the surface, and try to reproduce a polished surface, without seeing the beauty which may be in the model, but which he cannot understand. (It would be just as senseless to expect a child who does not know his scales to play a sonata of Beethoven's.) The greatest harm resulting from such a

proceeding will be that, when the student comes to model from Nature, he will not understand what is before him, and will model as he did from his antique copies a round and polished form, without heed of anatomical construction. He may go on working all his life without making any real progress. We ought from the beginning of our studies to understand what is before us, to find the reason for each depression and each projection, regardless of the time it takes us to analyze them.

When we have learnt the reason, our studies will proceed fast enough ; and when we have mastered the principles and laws of Nature, we can give free scope to our personal sentiment. Then there will be no more need of a teacher ; for, to impose a style on a student, without knowing whither his bent, his temperament, tends, is a crime. For is it not killing in him the artistic germ by imposing on him one's own way of looking at Nature? He may only become an imitator of his master's style, and never a good imitator, unless he happens to be of absolutely the same temperament.

I have said before: "Individuality makes the artist." Mind you do not misunderstand the word! Do not strive to be original, for the result of such an effort is often deplorable, as many people have confused eccentricity with originality ; the word "personality" will perhaps better convey my meaning.

Unfortunately it is not given to every one to have a distinct

personality or individuality; few have this supreme gift; and for the others, my advice is to seek in the branches of Industrial Art employment for which their studies have well qualified them. It is a well-known fact that sculptors who have begun by studying from the human figure can easily adapt themselves to other branches of the art, and, after short apprenticeship, soon excel in them, which is not generally the case with those who have begun with another branch,—say, flowers, ornaments, animals, &c.

After having modelled two or three heads from plaster-casts, the student may pass on to the study of the living model, the head from Nature. I need hardly say that this study of a head must be repeated and continued for a long time.

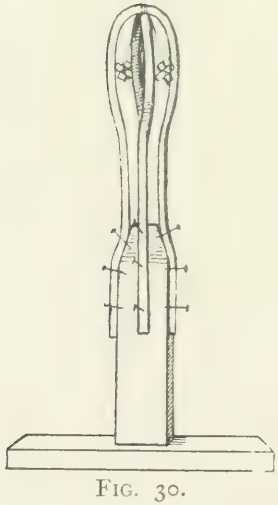


Fig. 30.

Provide yourself with a wooden modelling-stand—that is, a board (about 18 inches square) in the centre of which an upright piece of wood, about 9 inches high and from $1\frac{1}{2}$ to 2 inches square, is let in and firmly fixed with wedges. (See Fig. 30.) On to the upright nail a piece of lead piping, to prolong the framework up to the summit of the cranium of your bust, as Fig. 30 indicates. If the lead pipe is not very strong, it will be advisable to have two butterflies suspended from the top, one

for the front, one for the back of the head. The advantage of using lead piping consists in its movability, if one wants to change the action of the head during work, without destroying what one has already done. A framework, for whatever study, should always be strong, and at the same time malleable, after being covered with clay. It is therefore very important that the student from the beginning should make his frameworks very carefully, as by that he will save time in the end.

When the framework is finished and placed on the turntable, you proceed to wet the board and pipe and make a good clay paste over them. Begin by covering your framework at the neck, at the level of the collar-bone; *i.e.* put a ball of clay, about 1 or 2 inches projecting, in front of the lead pipe, and the same at the sides and back of the pipe, so as to make sure of having the latter well in the centre of the neck. Taking this mass of clay as your guide, you raise a column of clay right up to the top of the head, and then complete your column in a downward direction to the board on which your frame rests. I lay stress on your placing your pipe well *in the centre* of the bust; if you do not, you are sure to have it come out at an inconvenient place, where you cannot push it in without destroying some of your modelling. (See Fig. 31.)

After having built up this column of clay, turn your work so as to face the profile; calculate or measure (from the place where you fixed the articulation of sternum and collar-bone) the

height of the chin, and mark this place by a horizontally projecting, small peg, of about the thinness of a match ; place at once a sufficient amount of clay from the neck to the projection of the chin,—always pressing each fresh ball of clay well on to the preceding layer, so as to make it adhere and avoid air-holes. Pay attention to getting the right projection

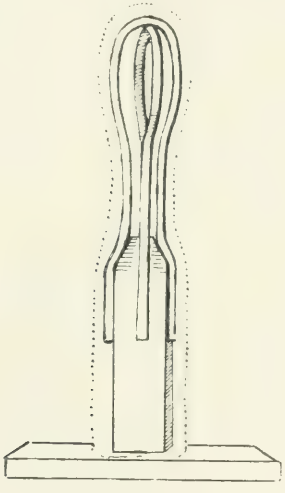


Fig. 31.

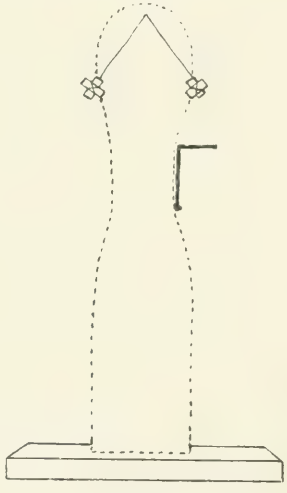


Fig. 32.

from neck to chin *at once* (by measuring and using the plumb-line), else it might happen afterwards that you had to cut into the neck, which would expose your pipe. This happens nine times out of ten to pupils, who, in their hurry to get expression into their work, or even to build up the hair, consider these instructions as insignificant details. It would be better to increase the projection than to make it too short. (Fig. 32.)

Then continue in an upward direction to put in the projection of the face up to the top of the cranium, so that you get a general line of the profile (see Fig. 33), and go on continuing this outline to the back of the head, all the while keeping slightly *under* the actual dimension.

When you have thus set up the profile, front and back, face your work, and add—with the projection of the profile as your

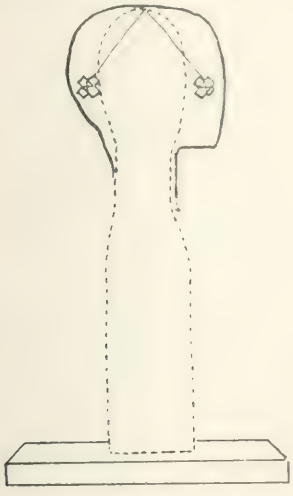


Fig. 33.

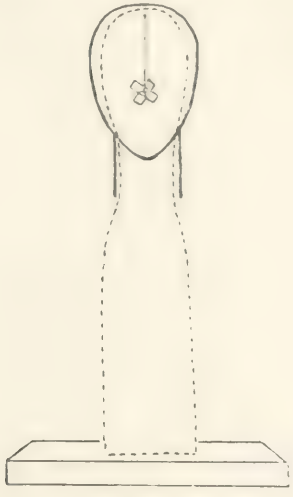


Fig. 34.

guide—sufficient clay at the sides to make an oval, on which to work the detailed features of the face (Fig. 34), always putting on less clay than the actual volume finally required.

Turn again to the profile, and from the previously fixed point at the top of the sternum—the *supra-sternal notch*—add the profile of the sternum, which you will find to consist of

three planes, mostly in an outward and downward direction. Then place the collar-bones starting from the *manubrium*, or upper part of the sternum, to the shoulders ; fill in the angle between sternum and collar-bone by placing the great *pectoral* muscle ; then at the back find the approximate place of the last *cervical* vertebra, *i.e.* the *nape of the neck*, and fill in the place from there to the shoulders with part of the *trapezius* muscle. All these preliminaries carefully executed will save you a great deal of difficulty later on. I have already mentioned that you should roll the clay in your hands before putting it on, as this will prevent your work from being too rough, and will assist precision in the superstructure. (Fig. 35.)

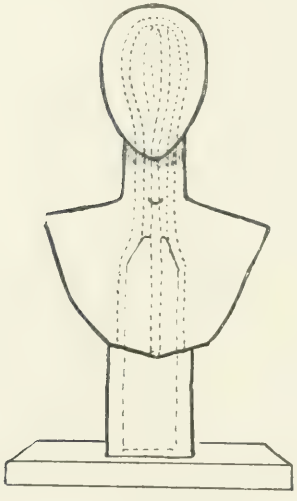


Fig. 35.

It is well at the beginning to make your model *stand* by your modelling table, or *sit* on the throne, so that his head should be at the level of your work ; and make him hold his head quite straight and upright at the beginning,—without regard of the pose you wish to give him afterwards,—as this will greatly assist you in getting the proportions and measurements well established.

Having thus prepared the foundation for your work, you

begin very carefully to take the following measurements with a steady pair of callipers :—

1st. The distance from *ear to ear*, taken from the deep notch between *Tragus* and *Antitragus* (see Fig. 36A and B). Set this measurement off on the two sides of your oval, and mark the points by two pegs of wood or matches (I advise you to take matches, and I shall just call them "matches" in future, as these are firm, without being too thick), pushing the wood in so far that

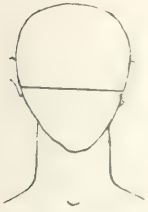


Fig. 36A.

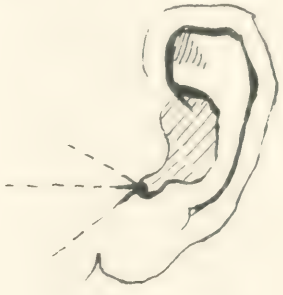


Fig. 36B.

the extreme projection will just be the exact measure. Of course, before settling the place for these notches, you must make a fairly accurate calculation how high above the sternum and how far back with regard to the chin they will be. The preliminary use of the plumb-line is therefore much recommended, and do not shrink from taking a little extra trouble, for these two points are the starting-points for all your measurements of projection. Note also from the front whether the two points are horizontally on the same level. When you feel

pretty sure of having got your matches at the right points, put some clay round them to keep them in place.

2nd. Then turn your model and your work to the profile, and by means of a ruler or any other straight-edge, held at arm's length, in a horizontal position, ascertain the relative position which the tip of the nose bears to the notch of the ear, *i.e.* whether it is just in line with it, or above or below. Try to carry the difference, if there is any, well in your eye when you hold the straight-edge before your own bust, and mark the point for the tip of the nose by another match. Compare this

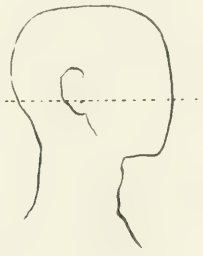


Fig. 37.

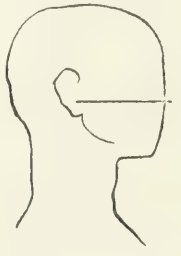


Fig. 38.

well from the other profile, so that you get the nose well in the centre line of the face. (Fig. 37.)

3rd. Measure on your model the distance from the notch of the ear to the most projecting part of the nose-tip (Fig. 38) (take this measure on both sides, for you will frequently find that the distance on right and left side varies), and set off the measurement on your bust; and when you have arrived at the true projection from both sides, push your match in until

its projection will accurately mark the point. Thus you will have obtained not only the distance from ear to nose, but also the central part of the face. Build the nose up, so as to make your measure firm.

4th. From the tip of the nose measure the distance to the most projecting part of the chin, *i.e.* the subcutaneous *mental eminence*, and then put one leg of your callipers gently but firmly on the measure for the nose, and strike an arc on the chin. Hold the callipers with one hand, and with the other place the indispensable match in the centre of your arc, letting it project sufficiently. (Fig. 39.)

Fig. 39.

5th. To make sure of the correctness of the previous measure, you now take the distance from the ear to the mental eminence (see Fig. 40) in your callipers, and if this measure, taken from both ears of course, coincides with the previously fixed point on the chin, your measure runs a fair chance of being correct. If it is not, you have to alter the place of your match—pull it out, or push it in—and retake both measures, until they agree.

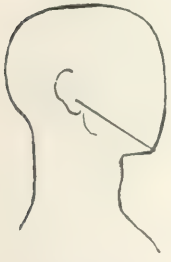


Fig. 40.

6th. Measure the distance *from the chin to the beginning of the hair*, by placing one leg of your callipers on the match marking the mental eminence, and striking a small arc above the forehead. (Fig. 41.)

7th. Take from the profile the distance *from the ear to the beginning of the hair*, and intersect on your bust the last described arc. Take the measure from both sides, and when your intersections agree, insert your match. (Fig. 42.)

I need hardly repeat that these seven measurements must be taken with the greatest care and precision, and should not be changed during the progress of your work, unless you have doubts of their being correct. In that case, you have to take

Fig. 41.

Fig. 42.

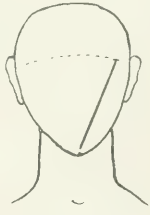


Fig. 43.

them *all* again, for by altering one, you throw the others out of proportion, and the fault is often not where you believe it to be. Take care also to keep their extremity uncovered with clay, and do not push them in before your bust is quite finished.

There remains another measure to be taken, which, although not as important as the previous seven, may be very useful. It is the distance from the chin to the eyebrows. You take this measure by describing an arc on the model, in order to find out if the eyebrows are of the same height on either side, and

FIG. 44.

[To face page 51.

set it off in the same fashion on your bust. (Fig. 43, and photograph, Fig. 44.)

In order not to worry the model by repeated measuring, it is a good plan to take your measures down in writing at the beginning. It is best to take a board (or a substantial sheet of paper) on which you draw a straight line. At the extremity of the line mark a point, on which you plant one leg of your callipers, and with the other leg describe an arc intersecting the line, and on this arc write distinctly which measure it is; for instance, "ear to nose," "chin to brow," &c. Having your measurements thus safely on paper, you have the advantage of being always able to verify them after the model is gone, so as to make sure the points have not been moved accidentally.

Now that you have your framework properly made, a certain mass of clay to work on, and the exact proportions of the face, or at least of the principal points, you must set to work at the bony construction of the head in its great lines, its principal projections and depressions. The bones form the framework of the human body, and support the muscles; it is on their proportion and relations to each other that the principal character of a head depends. If the bony construction and projections are not correct, you will never obtain a striking likeness, however good some of the details of your work may be; but, if the anatomical part is well set up, the details will fall into their proper place and help on the resem-

blance. Besides, the taking of these measurements has also the advantage of accustoming the pupil's eye to *see* correctly; for, having fixed points from which he may not depart, he is compelled to put the intermediate proportions in their right size and place. After having done such a study a few times, his eye will be corrected of its bad tendencies, and he will naturally acquire a true conception of masses, and feel that he must make sure of some principal points first, instead of piling up a confused mass without order and intelligence.

Most sculptors nowadays build up their work in the way I have sketched, although there are many who do not render themselves a clear account of it, because they have only arrived at it after much groping in the dark and loss of time. It is, therefore, not a question of inculcating new and arbitrary ideas in the mind of the student, but of initiating him at once into a method and practice at which he needs must arrive in the end, but would often only arrive by slow and uncertain ways. To arrive at it quickly, you must proceed with order, knowledge of the reason why,—in fact, substitute method for empiricism.

Once the student has grasped that the first study consists in appreciating the positions of certain fixed points, he will be able to select others that appear to him noteworthy and favourable to his work.

The teacher, on the other hand, must carefully watch over

the pupil whose work he directs · he must make sure that the pupil makes a good and careful start for his work, and get him into the habit of working carefully, so that he may learn to do it in the end instinctively.

Having then regularly followed the course of study that I have sketched, and acquired a certain correct judgment of the eye and a certain skill of hand, he has further in the use of horizontal and vertical lines a steady and positive auxiliary, and will be able to work with order and method.

He will now begin with the orbits (taking as his guide the arc he struck for the eyebrow), by hollowing out two deep spaces at the side of the nose, and indicating the shape of the brow above them, and the form of the cheek-bone at the side and beneath them, so as to have the orbit ready for receiving the eyeball. Then sketch in the forehead, with regard to the formation of the bones; further add the nose, which you join to the brow; at the extremity of the nose at once indicate the bean-shaped nostril; then the lower jaw bones. Start them from the ears, well observing the angle they form below, and by them join the ear to the previously fixed point of the chin; indicate the depression between chin and lower lip; then model the upper jaw, marking at once the two corners of the mouth, well observing their relation to the size of the nostrils. Having indicated the large lines and places, — rather sparsely, — you turn your model as well as your study to the profile, and set the ears

up, regulating their projection again from the front view; then draw the outline of the crown of the head and the back of the head, going on to the outline of the neck (to below the nape of the neck); come back to the front view, and do the side of the neck by laying on the *sterno-cleido-mastoid* muscles from the *sternum* to the *mastoid process* behind the ears, and the *trapezius muscle*. Then, looking from below and from the front, draw the shape of the collar-bone, and from the profile re-draw the oblique line of the sternum, and connect these bones by the *great pectoral muscle*. Go once or twice again over the same ground, by looking at model and study from other points of view, which will give you the projections of the bones; and then from the front give symmetry to the two sides. The *bones* should have their *true* projection as early as possible, for their proportions serve as guides to find the other points, whilst the muscular parts should, up to the last, be left rather below their actual volume.

The more care you spend on this preparatory labour, the less you will feel that uncertainty which is so apt to discourage one, and to destroy one's interest in the model. Need I say that, after this preparatory laying on, you resume your work by starting from the profile view, and *drawing*, as correctly as possible, as if you had a pencil in your hand and the clay were your paper, not only the profile of the face, but also of the back, of ears, neck, chest—in fact, of the entire structure,—comparing

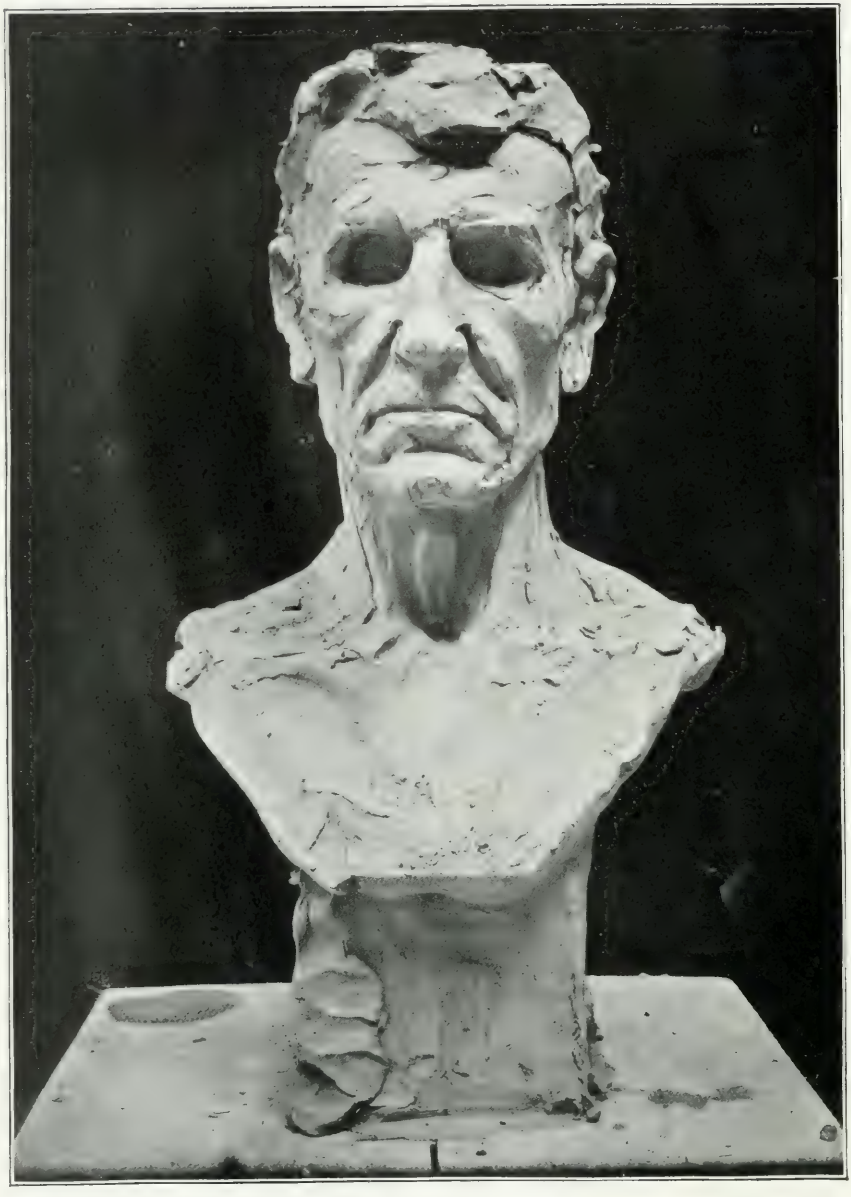


FIG. 45.

[To face page 55.

FIG. 46.

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the proportions as to length and width, applying mentally horizontal, vertical, and oblique lines from one point to another, just as you would do in drawing a head. The same process is to be repeated from the other side, then the outlines of the sides of the head, looked at from the back as well as from the front. After this, the three-quarter views must be drawn in the same way, always taking care that you look at your model and your study from the same point of view. (See photographs 45 and 46 of bust in clay.)

Having proceeded so far, you may now give a pose or movement to your bust, if you wish it. If it is a portrait bust, you should only do so after having attentively observed the habitual pose of the person you are modelling. Everybody carries his head on his shoulders in a slightly different way, the very action of the shoulders has an individual character, so has the direction of the eye, &c. In short, you must well observe the characteristic attitude of your model, which in a bust goes a long way towards the likeness. It would be ridiculous to give to a timid and simple man the action of a fighting man (a gladiator) ; a thinker, a philosopher, does not carry himself like a shop-walker or like a tragedian. In short, no man resembles another man, either in every feature or in attitude and bearing.

Such observation takes time. You cannot properly execute the bust of a man who might come to your studio, saying he wanted his portrait done, and begun then and there,—as he

would say to a photographer. You ought to know him first ; you ought to see him in his private life, to know what he is really like. Having found out what pose is most natural to him and corresponds most with his character, then you may start work on your portrait ; for a bust is not merely the photographic presentment of an instant,—it should be that of a collection of instants, a sort of biography. That is what makes many busts of the old masters so admirable, and that is what you find in many of Holbein's portraits. There are portraits of which you have never known or seen the original, of which you know neither name nor origin, and yet—in their features and bearing—you can retrace their character, their way of living and thinking, the race from which they have sprung ; and therein consists a great part of the attraction, of the unconscious admiration, we feel before them.

For a pupil who only makes a study from the professional model, the difficulty is not quite so great, although it will be excellent and desirable that he should also observe in this sense as soon as possible ; but what he has to learn first is to proceed carefully and methodically in his work.

He must first give to his model the action which suits his purpose best. The lead framework inside his work will allow him to take a firm hold of the head with both hands, and turn it right or left or slightly inclined, so as to make it like the action of the model. In taking hold of the head, he should

place his hands behind the ears, so as not to touch the latter, and with gentle pressure he will be able to manage the turn in whichever direction he wishes.

Having accomplished this much, you must turn your observation to the *lines of contrast* produced by the action of the model—for, if you turn the head on one side, it follows that the shoulder, in the direction in which you turn, comes forward, and, generally speaking, it will also be higher than the other shoulder whence the action starts. That gives you *four contrasts, two contrasts of line, and two of projection.* (See Fig. 47.) To obtain these on the study, you proceed in the same way as for the head: you take hold of the shoulders with both hands,—one hand behind the shoulder to be thrust forward, the other in front of the shoulder that is to go back, pulling the former and pushing the latter to obtain the desired action, and on the same principle raising the one and lowering the other.

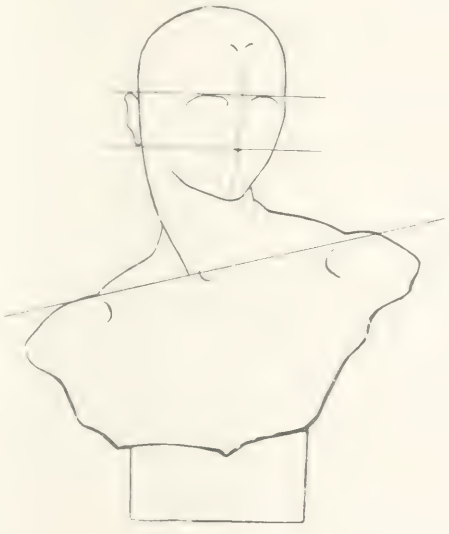


Fig. 47.

Now, having settled the pose, the proportions, and to some

extent the construction, the drawing is the *one thing needful* to occupy your hands and eyes.

You may now indicate the eye, or rather the globe of the eye, by placing a round ball of clay in the orbit, trying from the profile view to get the same projection as in Nature with regard to brow and cheek-bone. Lay over this, first the upper eyelid, by means of a rather flattened ball of clay, and here I draw your most careful attention to the two corners of the eyes—the inner and outer corner ; on them depends the place of eye and cheek, &c. They are, so to speak, *central points*, which give the key to the outlines of the face. If you place them *too deep*, the outlines of the cheek will recede too far, and the nose will stand out too much. If you place them *too low* with regard to the mouth and brow, the nose will appear too short, as they descend too far down upon it, and thus cause the distance between the root of the nose and the nostrils to appear too short. If they are *too far apart* from each other, they will be too far from the centre-line of the nose ; and not only will they make the nose look too big at the root, but will bring the outer corner too far to the side of the face, which will incline you to enlarge the temporal part, and thus make the whole head too wide. Thus you will understand how important it is to fix these points correctly by eye and measurement. A careful measurement from inner corner to inner corner, rectified by another measurement from, say, the centre of the mouth or

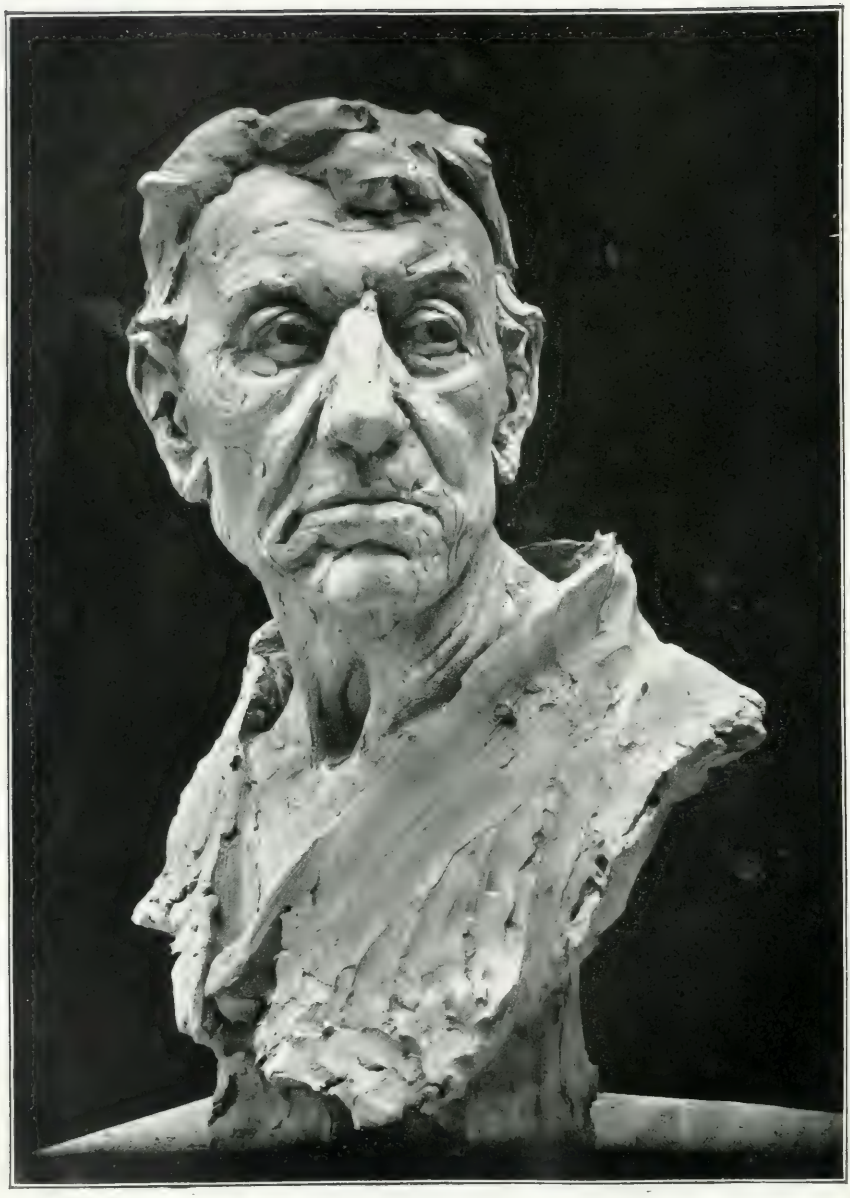


FIG. 48.

[*To face page* 59.

FIG. 49.

[*To face page* 59.

FIG. 50.

[*To face page* 59.

the extremity of the nostril, will assist the eye to fix the place. For the outer corners, measure similarly, and observe that the outer corner is *always* higher than the inner corner—a fact to which I have continually to draw the attention of my students! A smile will further raise these outer corners, whilst a sad expression slightly lowers them. It may assist you to measure their distance from the ear, *i.e.* the notch between Tragus and Antitragus, from which we have taken our other face measurements, and from any other point that strikes you as being an assistance, for the outer corners are as important for the true outlines of the cheek as the inner ones. (See photographs 48, 49, and 50 of head in clay.)

Arrived at this stage, the student ought to turn the model and his own study as often as possible, both to afford him always the same point of view. When I say "turn," I do not mean that the throne should be turned far round, but rather a small distance, say two inches at a time, so as to give you not only direct profiles, but three-quarter profiles and profiles seen from the back, &c. If you carefully work round the model in this fashion, by the time you come back to the front view, you will be able to correct by means of your anatomical knowledge, and to give expression and intelligence to the mechanism of your work.

You should put the hair on with regard to its principal masses, which ought to be laid on in varied planes, for

the suppleness of hair is never obtained by detail, but by numerous planes or surfaces, which give variety of light and shade. Once these surfaces are put in, a few intelligently made touches with the tool (or the jagged end of a broken piece of wood), and a few small balls of clay put in very decidedly, will give much more life and suppleness to the hair than a number of detailed scratches, which will only impart a hard, metallic air to it.

Here I would also advise you to study *how* the hair grows round the face, and that it is paler in colour at its roots. As a painter mixes a little flesh-colour with the local colour of the hair round the face and on the neck, so you must blend its origin in these places with the fleshy parts, so that it does not look *stuck on*, but *growing on*.

After having thus indicated the hair, and drawn and re-drawn the bust from every point of view, and modelled the whole together by an intelligent understanding of the anatomical form, and having corrected every possible mistake from different points of view, you ought to put yourself in a lower position than before, and look up to study the section of every feature on the model, and correct your work from the same point. This has, of course, to be done all round the head, and afterwards you have to mount on a stool and look down on the model and your work, to study the sections of the head and features from above, and correct wherever you find the slightest deviation from the

right outline. Remember that you must particularly study and work up *those parts which are not seen* from the front view ; it is those same points which make the face by showing you the projections, which you could not possibly see if you looked at the model from the front only—(a daily occurrence at the art schools, however much the teacher may try to prevent the students from doing it), the face becomes flat, and is naturally without colour and construction. Therefore, I say again : turn and turn, draw and re-draw, from below and above, as well as all round. Neglect not a single point ;—under these conditions only will your bust be well set up and constructed as a work deserving the name of sculpture.

To *finish*, put your model in a side-light : a strong effect of light and shade is the best to show up the direction of form. It is well understood that you try to put your work in the same light, not only as regards outline, but also with regard to the value of light and shade.

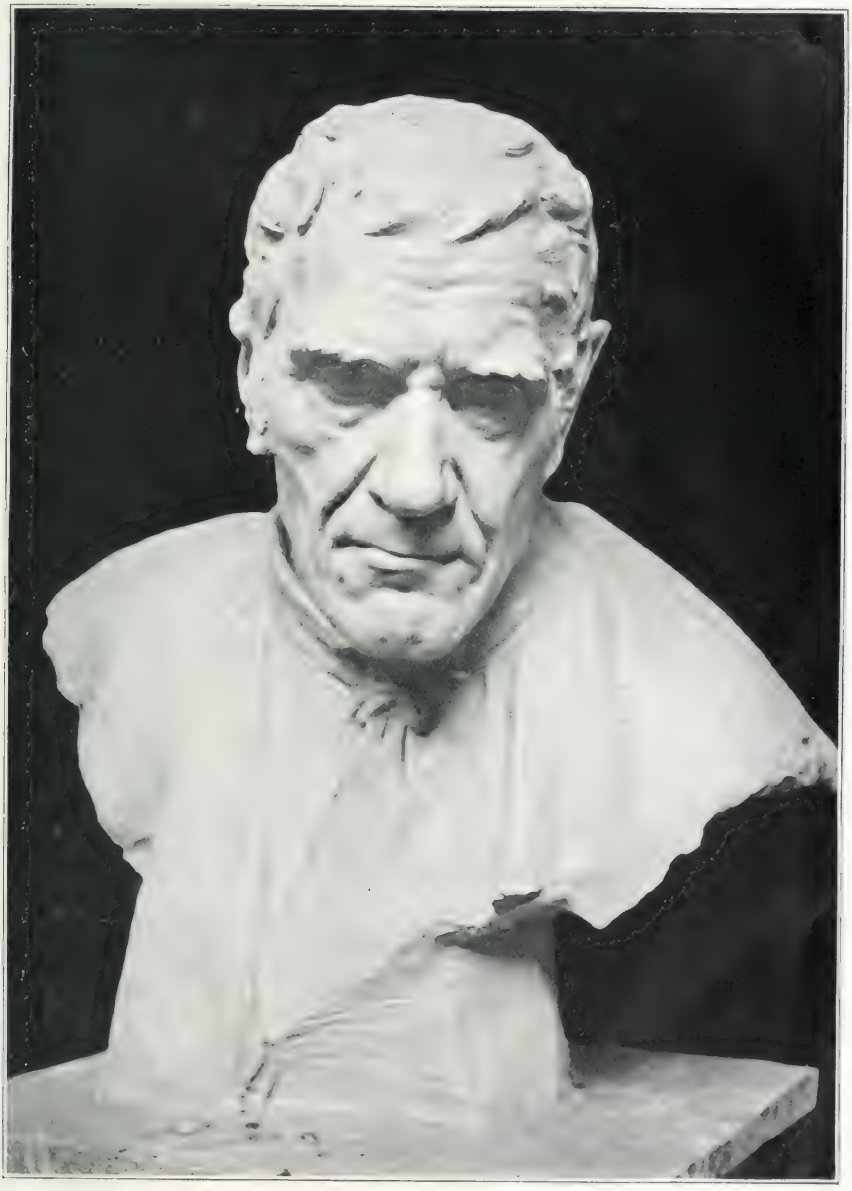
In working from this point of view, be guided not only by drawing, but also by anatomical form for expression, and by colour for simplifying. If you find a shadow too dark, you may be sure that the space is too hollow ; if, on the other hand, it is too light, you may be sure it is too flat, and so on for the half-tints as well. Do not forget that now you must modify your effects as often as possible, and always have model and work in the same effect of light—side-light, of course—for the light from

the front must serve you only to see the result of your work and re-view it, so to speak ; to work in, it is the most dangerous light, as it shows you very little of form, and leads the pupil to polish and fill up without rhyme or reason, so that the result is a heavy, expressionless piece of work. See photographs 51, 52, and 53 of head in clay.

When you are at the finishing stage, it is well to model a little across the form, to obtain a richer substance ; and with very soft clay cover the whole surface with a continuous layer of skin, which will blend the depressions and convexities together. Such details as wrinkles on the forehead, or crow's feet below the eyes, should not be obtained by cutting into the clay, but rather—for the sake of suppleness—by superposing clay which the finger ought to shape into the right form on the work, and which should be very much effaced again, so as not to show too much.

DIAGRAM OF CONSTRUCTION OF THE FEATURES

In the elementary part I have already described the divisions in the *form* of the mouth ; now I wish to draw your attention to the movement of the *planes* at the corner of the mouth. These movements are produced by the *Orbicularis Oris.*



EXAMPLE OF STUDY FROM LIFE.

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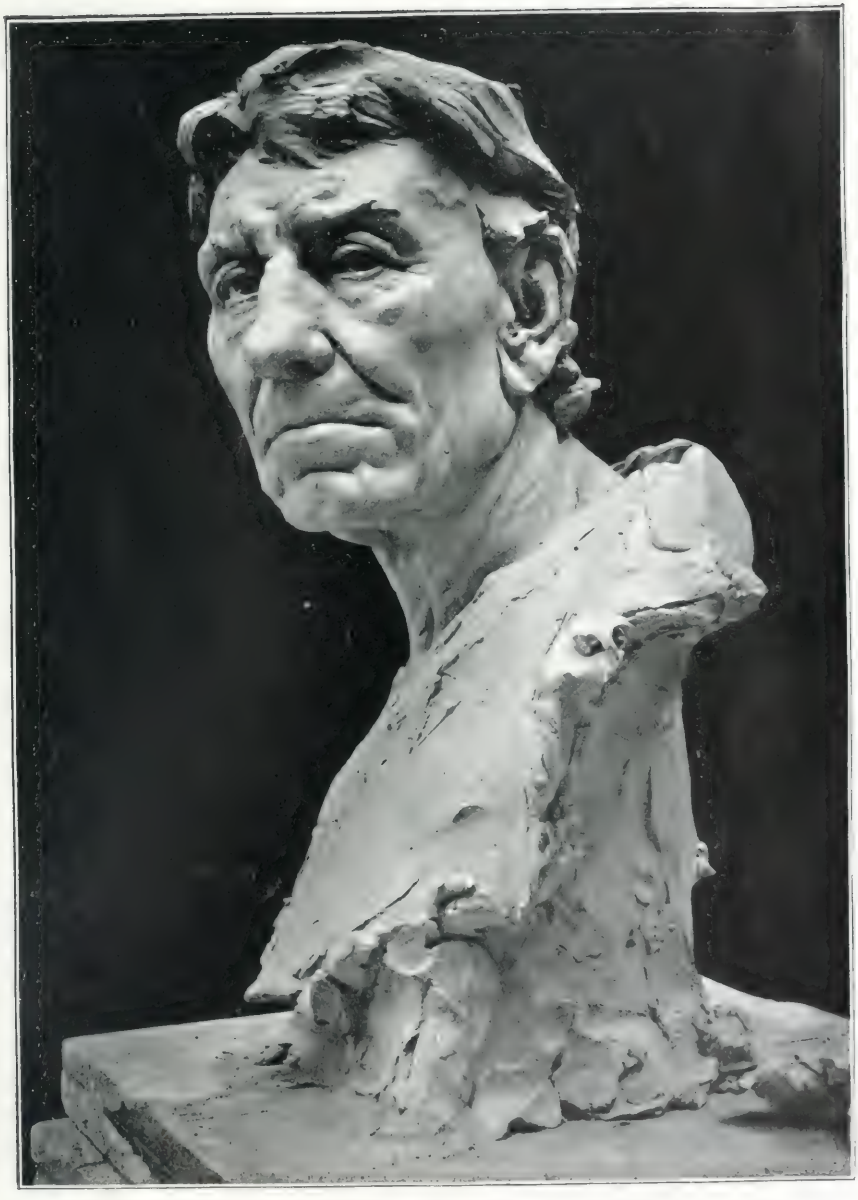

FIG. 51.

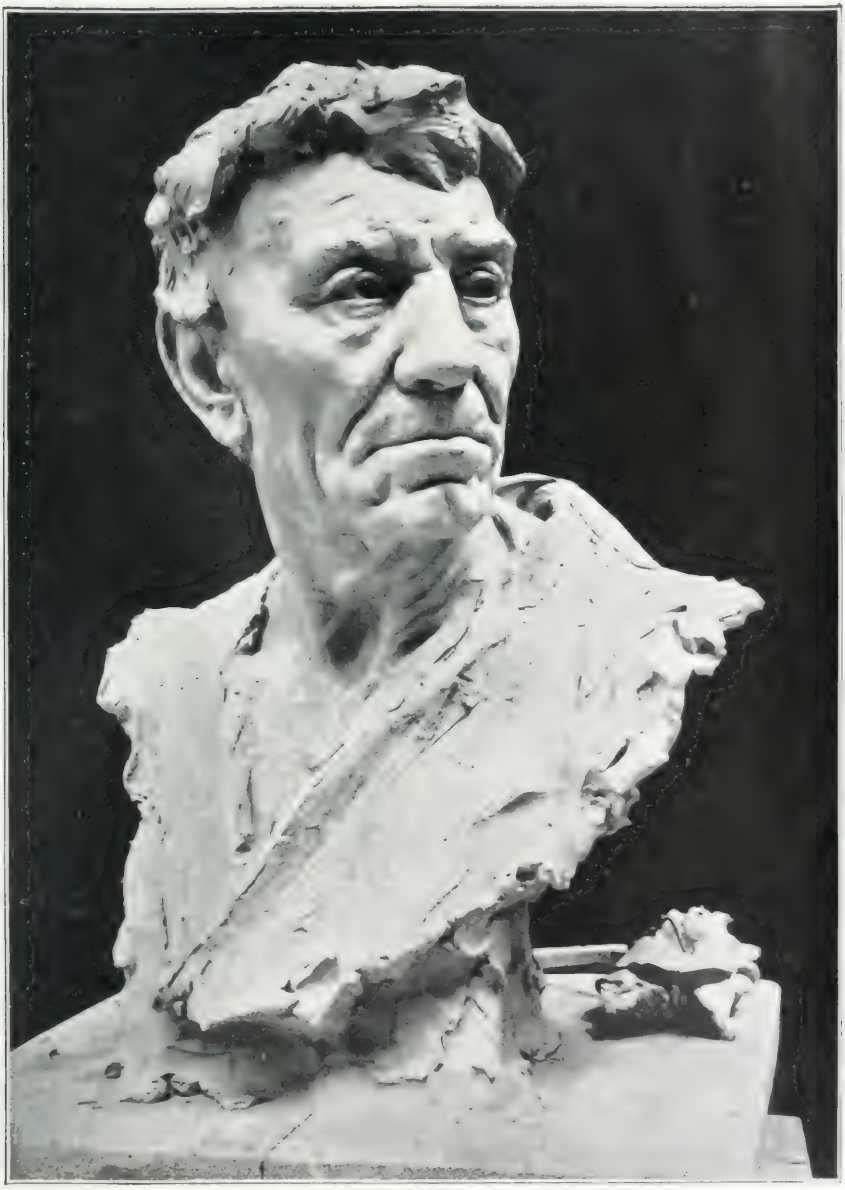

FIG. 52.

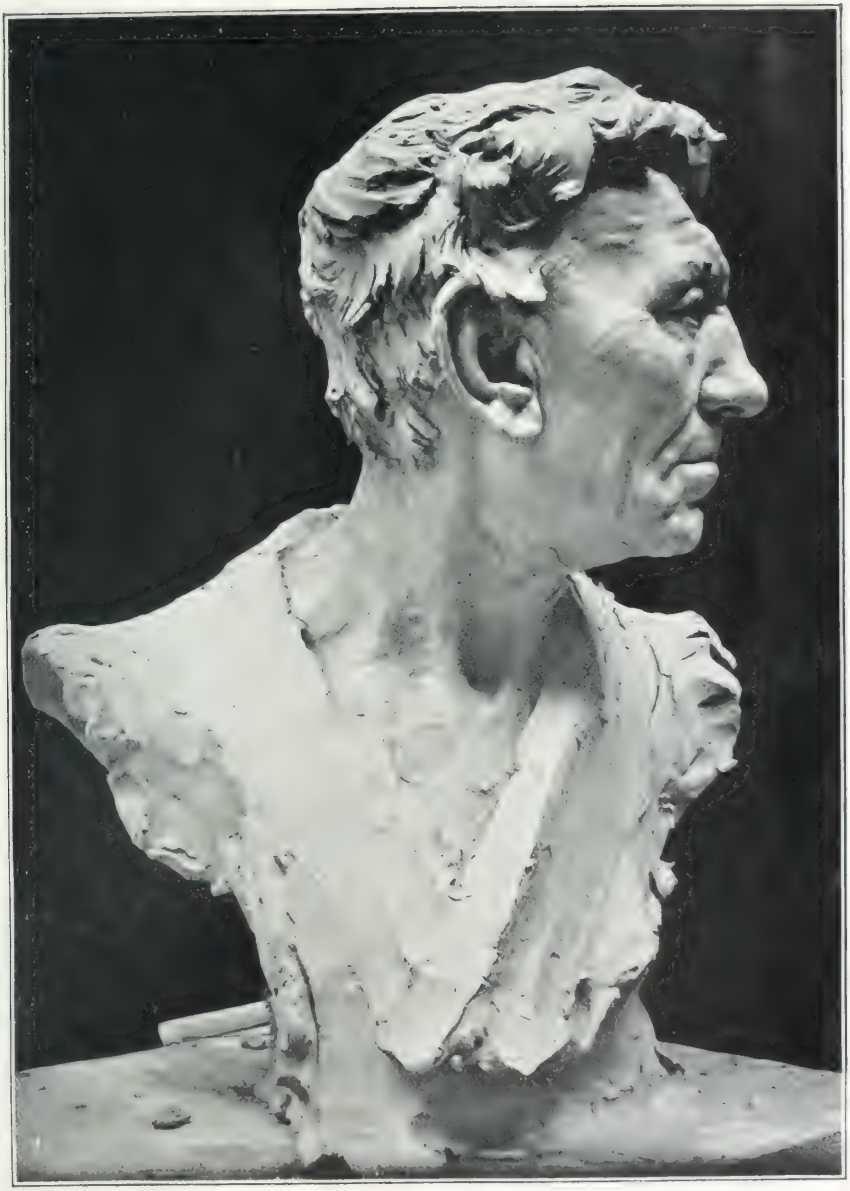

FIG. 53.

You notice on the top of the upper lip a large, slightly curved plane, which, diminishing in size, and twisting as it were, round itself, extends to the corner of the mouth. (Fig. 54.)

This effect is produced on both sides of the upper lip, and in the same way on the lower lip. (Fig. 55.)

These movements form a *radiation*, the centres of which are the two corners of the mouth. It is almost like a hinge-joint,

Fig. 54.

Fig. 55.

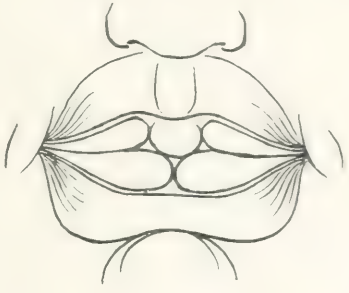

Fig. 56.

which suggests the impression that the mouth can open and shut when and as it likes.

The upper lip presents three masses, the lower lip two masses, and two other large masses stand well out underneath the lower lip—all of these accounted for by the Orbicularis Oris. (Fig. 56.)

Nose

The shape of the nose is decided by bone and cartilages.

When the drawing of the nose, both from the profile and

front, is pretty well correct, you must first study the shape of the nostrils, looked at well from below, and particularly note the ridge which separates them from each other. (Fig. 57.)

Fig. 57.

If this central ridge (Columna Nasi) is made too thick, the nostrils will be too far from the centre and the lower part of the nose will appear too thick. Try to indicate it correctly, and then draw the nostrils; by these inner contours you will get the outer contours correct.

The nose is often modelled too thin, and will consequently appear too long. I have often noticed that this mistake is

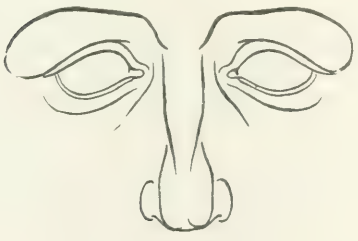

Fig. 58A, Wrong.

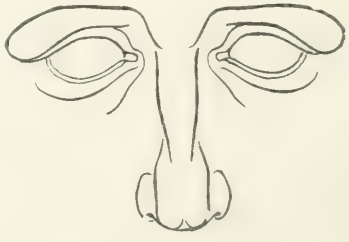

Fig. 58B, Right

owing to a misplacement of the *Lacrymal Fossa* at the inner corner of the eye. If this is placed too low, and if the line which starts from it forms a too acute angle, the nose is not allowed its proper thickness. Great attention ought therefore to be paid to the correctness of these lines. (Figs. 58A and B and 59.)

The division of forms in the nose is shown in Fig. 60. These forms are always existing there—even in the roundest of noses, where they are only less accentuated than in others. A strong side-light on the model will always show them up.

Fig. 59.

Another plane which is very important in order to obtain suppleness round the nostrils, starts at the outer, lower part of the nostril, follows its upper outline entirely up to the tip of the nose, where it forms a slightly-curved plane. (Fig. 61.)

I often see students make the outline of the nose in profile meet the upper lip at a *sharp angle*, as shown in Fig. 62. This never happens in Nature. There is always a small plane which

Fig. 60.

Fig. 61.

Fig. 62.

Fig. 63.

separates the two, as seen in Fig. 63; and this gives both distinction and mobility to the outline. Of course it is more pronounced in some persons than in others.

Ear

More than any other feature, the ear varies infinitely, its outer framework being entirely *cartilaginous*. Its drawing is generally vigorous in character. Its position with regard to all the other features is of the greatest importance. In the profile it is the *central point* from which you ascertain the distance to forehead, nose, mouth, and chin. (Fig. 64.)

Fig. 64.

Fig. 65.

If the ear is placed at too great a distance from the nose, the head will appear too thin from the front-view. (Fig. 65.) And from the side-view the back of the head will appear too small.

If the ear is placed too far forward, the opposite will happen, and the head will appear flat from the front-view. (Fig. 66.)

If the ear is placed too high, the lower part of the face will appear too long, and the upper part of the head will seem insufficiently developed. (Fig. 67.)

If its place is too low, the opposite effect will appear.

As a general rule, the direction of the ear is parallel to the direction of the nose (see Fig. 68), but there are numerous

Fig. 66.

Fig. 67.

exceptions, which the student will observe all the more for knowing the general rule.

Another general rule is that the top line of the ear falls horizontally in line with the highest point of the eyebrows, and that its lower border is generally level with a horizontal line drawn from the nostrils. Refer to Fig. 68.

The length of the ear varies enormously, but a well-propor-

tioned ear fills about the space between the two horizontal lines indicated on Fig. 68.

The outline of the ear, looked at from the front of the head, is a matter which demands all our attention. If the ear were too flat, *i.e.* not standing out from the head like that of the model, the face will appear too thin. This is a mistake which

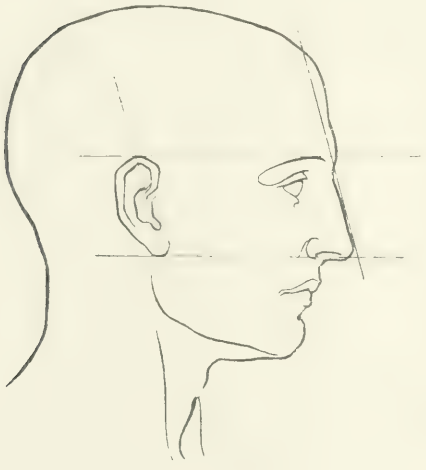

Fig. 68.

Fig. 69.

Fig. 70.

nine out of ten beginners will commit; as a rule, they will make the ear almost stick to the skull. It is therefore most essential to study the outline of the ear, not only from the front, but also from the back, and carefully to note the distance which separates the border of the *Helix* from the *skull*, as well as the depth and drawing of the *Concha*, or shell. (Fig. 69.)

There is another point to which I must draw special

attention. It is the way in which the *Tragus* follows the perfectly round opening of the *Auditory Meatus*. Consequently it should not be made flat. (Fig. 70.)

Eye

I repeat myself, and remind you that the globe of the eye lies in the socket, called *Orbit*. (Fig. 71.)

The eyebrow forms an elongated mass, starting from the inner and upper border of the orbit, and following it as far as its

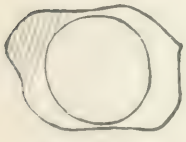

Fig. 71.

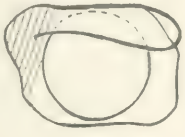

Fig. 72.

Fig. 73.

Fig. 74.

external border. Its form is larger at the outer end than near the nose. (Fig. 72.)

The upper eyelid starts from the corner of the *Lacrymal Fossa*, and overlies the eyeball. It is larger in the centre than at its extremities. (Fig. 73.)

The lower eyelid starts in the same way from the Lacrymal Fossa, and, closely overlying part of the eyeball, it joins the upper eyelid from below at its outer corner. (Fig. 74.)

In beginning the eye, the bony construction must be the first consideration; having obtained that as correctly as possible, you proceed as the diagrams show—first, by putting in the

globe, and trying to make its projection correct by studying the eye of the model from the profile as well as from below. Proceed in the same way and at the same time with the other eye. You should never finish one side of the face without having established the construction of the other side, or you will not obtain the effect of *unity* in the face.

The eyeball having been placed in the right projection, the eyebrow must be laid on and studied *from the profile for projection from the front for drawing, from below for its section.*

Settle the distance between the Lacrymal Fossæ, from the full-face view, and their depth with regard to the nose, well bearing in mind the difficulties I have already indicated in the earlier portion of this guide. (Fig. 75.)

Fig. 75.

Starting from the Lacrymal Fossa, you put in the upper eyelid, noting in the same way as for the eyebrow the projection from the profile view, and the section from looking up to it.

For the lower eyelid you proceed in the same way.

If, instead of beginning the eye with its anatomical construction, you were to put a lump of clay of any shape and anyhow, and tried to dig in it and scrape it about in order to obtain the drawing of eyeball, brow, and lid, the result would probably be an inert and weak feature that could never suggest the movability of the eye.

Another point to be attended to is, that the black spot of the pupil is in the most projecting part of the eyeball. Thence it follows, that directly above it is the highest point of projection of the upper eyelid as seen from below.

If the model looks towards the side, the outline of the upper eyelid from the Lacrymal Fossa forms more or less a straight line up to the central point of the pupil, and from there makes a rapid curve to the outer corner, *i.e.*, where the upper and lower lids meet (Fig. 76); whilst in the other eye you observe the

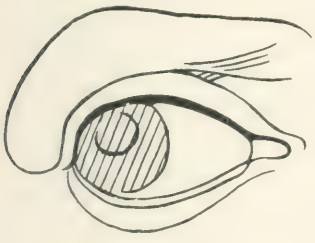

Fig. 76.

Fig. 77.

contrary—the long straight line starting from the outer corner, and the rapid curve of the lid being from the highest point towards the Lacrymal Fossa.

It follows from this, that the two *Caruncles*, that lie in the Lacrymal Fossæ, will present different shapes, when the look is directed to the side: the Caruncle of the eye which looks outward will be stretched and look longer than the Caruncle of the other eye, which is following the direction of this one and approaching the nose. (Fig. 77.)

I have already mentioned on page 59 that the outer corner must never be placed lower than the inner corner, and a horizontal line through the corners will assist the student to find its correct place. (See Fig. 78.)

If, in impressing these details of observation on you, I have repeated myself, you will readily excuse it when you realise how much they contribute to render the expression and direction of the eye strong and vigorous, and how feeble and even faulty the result is, when they are neglected. What can be more objectionable in a bust, than the two eyes looking at different points? Therefore, instead of experimenting and pushing the pupil a little to the right, or a little to the left, use every effort to verify the points I have indicated.

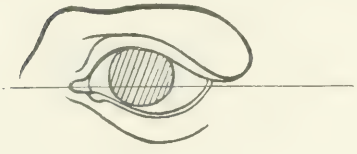

Fig. 78.

Hair

I have often been struck, when looking at busts, by the fact that the hair has the appearance of a wig put on the head.

This unfortunate effect is the result of ignoring the points from which the hair starts or is attached round the face.

Looked at from the front and profile, the attachment of the hair takes place in three masses: one goes round the frontal bone (coming generally to a point above the centre of the face),

the second mass is attached to the temporal bone, and the third, smaller, mass below the temples. (See Fig. 79.)

On the top of the head the hair is attached or grows round a central point, the Crown of the Cranium, from which the hair grows in all directions, like rays emanating from a centre. (Fig. 80.)

In black hair you accentuate the details, *i.e.* make deeper cuts to obtain the effect of a dark mass; in white hair details

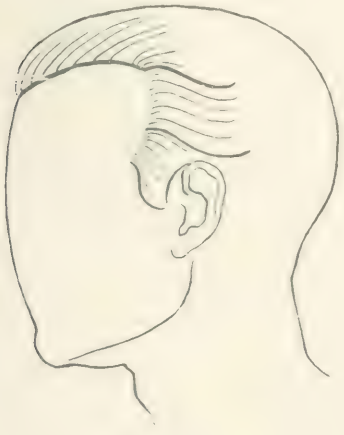

Fig. 79.

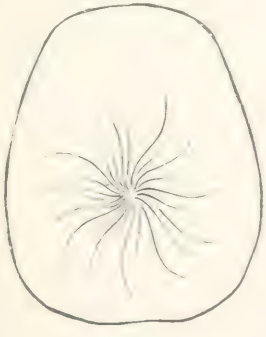

Fig. 80.

must almost disappear, and they must be massed instead of being broken up. The details should not be treated as ornament. To avoid ornamental treatment, it is necessary to take first the outer contours, and draw them in straight lines, well observing the angles which they make, for it is these angles and their distance from each other which decide the character of

the hair in individuals. After that, each mass must be divided by drawing it in firm, almost straight lines. Here it is very necessary to observe the variety of proportions in one mass, as compared to the other. And finally indicate the variety of planes which receive light and shade in various directions, and add a few touches here and there—some details, in other words—to indicate the fineness of hair. By these means you will avoid its looking heavy, monotonous, and ornamental.

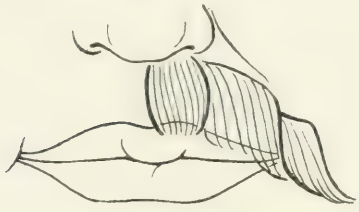

Fig. 81.

Moustache and Beard

The moustache grows on each side of the face in three absolutely distinct masses.

The first is attached below the nostrils.
The second is attached on the upper lip.
The third is attached on the cheek.
} (See Fig. 81.)

The beard is also divided into three large masses, which have their points of origin or attachment in different places.

The first mass grows underneath the lower lip.
The second mass is attached to the chin.
The third grows on the cheek.
} (See Fig. 82.)

The treatment of the beard in modelling is pretty much the same as that of the hair, but its execution is extremely difficult,

and it is necessary to make special and frequent studies of it or for it, for the treatment varies according to the effect of colour one wishes to give.

Badly executed hair and beard will spoil an otherwise good bust. It needs great taste —I might almost say *tact* —to know how much detail to introduce in order to preserve its colour without detracting from the value of the face.

Fig. 82.

Hair and beard must, so to speak, disappear—that is, they must not be the first thing which strikes an observer of the bust, yet they must be interesting.

Modelled tastefully, harmonious in colour and shape, they will complete a head and give character to it.

DIAGRAM OF FACE

This diagram represents the division of the forms of the face. (Fig. 83.)

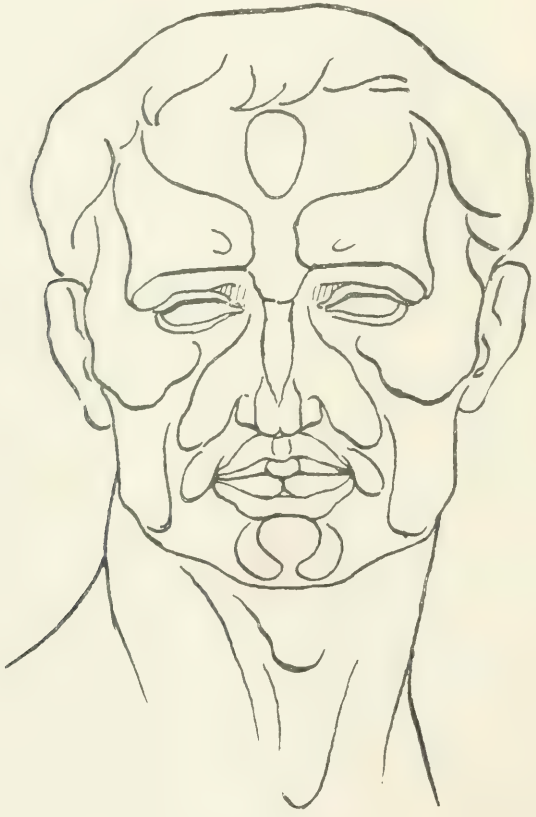

Fig. 83.

The masses which are indicated by outline are produced not only by the bones and the groups of muscles of the face, but

also by the skin, which covers them in following their undulations.

They exist, with a certain variety of drawing, and in a more or less accentuated manner, in the female as well as in the male.

In the child they seem to disappear altogether, but knowing that they are there, we find them indicated by extremely delicate planes.

In the face of an old person we see them quite clearly.

When in a face of very simple appearance the existence of these masses does not strike us, we must work continually with a strong side-light in order to obtain on the face of the model a variety of half-tints which will be produced by the planes or depressions that divide these forms, and which will show them more clearly to us.

If you ignore this rule, you will, without any doubt, produce a polished surface with no variety of modelling, and the result will be a face without suppleness or expression.

One of the most characteristic points in the works of Michel-Angelo, particularly in the statues of David and The Slave, is the neatness and purity with which each of these forms is drawn without anything being lost of the simplicity of the whole.

When these divisions of form have been obtained in their proper drawing by studying each separately, the work may appear a little hard. Then it becomes necessary to work by

colour—that is to say, by the comparative values of the half-tints, in simplifying or accentuating the surfaces or planes which divide these forms.

The simplicity of the model may be obtained thus, by leaving under this almost flat surface a mechanism, which not only gives expression to it, but enables the work to be exposed to every light without losing its value.

Take, for instance, a cast of the head of Michel-Angelo's David; let it be placed in any light whatever,—this head always retains its resemblance, and nothing seems to have been left to chance, the whole remains neat and clear; the planes retain the required direction, and, modelled well together, they give movement to the whole surface.

On the other hand, if a sculptor has merely sought to render the impression of the model by effect of shadows, more or less mysterious, by tricks of texture or of tooling—in fact, simply by means of "seasoning,"—these works, to preserve their quality, must be allowed to remain exactly in the same light in which they were done, under penalty of no longer being recognised, or of finding that which was expressive become insignificant,—in fact, all resemblance will be gone, simply because the light has been changed, and the work is thus reduced to a mere piece of plaster, having none of those ideal qualities of which that artist had so fondly dreamt.

Beyond the artistic expression of the work, which is the

direct result of our sentiment and individual taste, Sculpture exacts *positive knowledge of the laws of Nature.*

Michel-Angelo has proved this to us better than any other Master, by the numerous studies which he has made of every part of the human body, with a love that is only equalled by his scrupulous conscientiousness.

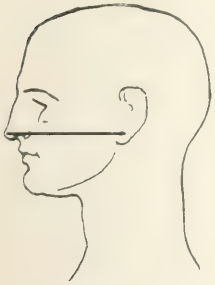

Fig. 84.

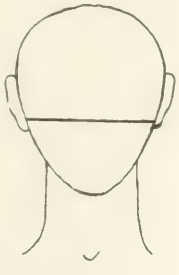

Fig. 85.

Fig. 86.

Figs. 84, 85, and 86 show you three proportions which are generally the same.

Namely: the measurement from ear to ear is equal to the one from under the chin to the eyebrow, and you will find the distance the same from the ear to the point of the nose.

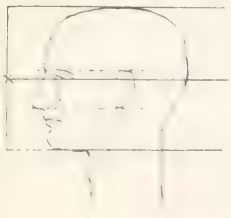

Fig. 87.

Fig. 87. This diagram shows you that the centre of the face lies on a line drawn though the inner corner of the eye, midway between a line drawn under the chin and another across the top of the cranium.

PART III

PART III

FIGURE FROM NATURE

Framework

We take for our study a figure half life-size—that is, about 32 to 34 inches in height. The framework I am going to describe will serve not only for a figure of this proportion, but also for a larger one, say of 6 to 9 feet high.

In figures of these proportions the framework may be erected quite straight—that is, without action; but for one of larger proportions, the frame must at once represent the action, and must be made from a previous sketch, carefully planned with the help of measurements and plumb-line, else it would not possess the necessary strength to support a large mass of clay; therefore, in a larger figure the lead pipes for the lower limbs are replaced by irons fastened in such a way that they can be moved at the artist's will without sacrificing strength and bearing power.

In a second volume I shall supply a series of drawings

of frameworks for various works, from which you will see that the principle remains the same, and that it is only the proportions of the iron and lead pipes which are different; they must be strong in proportion to the size of the work, and there must be the possibility of putting in more wooden supports and butterflies.

You require a wooden turn-table for your work as well as for your model; further, a wooden 1-inch board about 18 inches square with two strong battens underneath to prevent the warping of the board.

On this square you fix with screws an iron support, bayonet-shaped, so to say, which is to support the frame and consequently all the weight of clay.

This iron, for the half-life-size figure, should be about 20 × 10 × 5 inches (Fig. 88); so that allowing 3 inches thickness of clay for a plinth, it should enter the figure slightly above the middle of its height and below the posterior processes of the Ilium. If inserted lower, it would have too much weight resting on it, besides there being the danger of the frame being too movable, and thus unable to retain the given pose or action.

The horizontal branch had better be too long than too short; for the vertical portion of your support is liable to get in the way of the legs, for instance, in a walking action. I should advise any length between 9 and 12 inches.

The third portion of the iron should not go up too high in the torso, as one has sometimes occasion to change the action

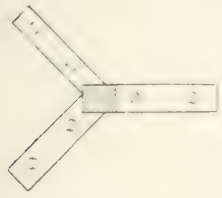

Fig. 88a.

Fig. 88b.

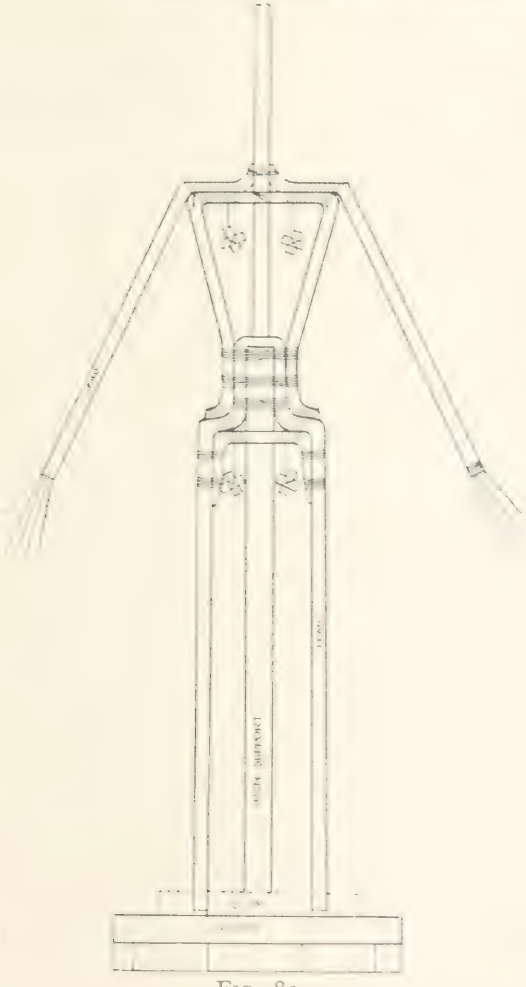

Fig. 89.

of one's work, and if the iron went too high, the torso would lose its suppleness. 5 to 6 inches therefore suffice.

There are poses which necessitate the iron to be fixed at the side of the figure and not at the back.

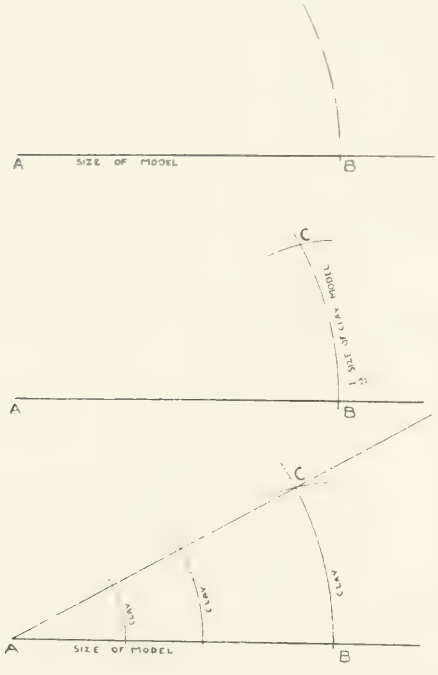

FIG. 90.

The iron being screwed on, you make your framework on it by means of lead pipes, which you secure firmly on to the iron by means of copper wire. I give the preference to copper wire over galvanized iron wire, as it is more pliable, less liable to break, and can be twisted tighter than iron wire round the lead and iron pipes. Fig. 89 will give you a clear idea how to make your frame.

The next step is to make a *Scale of Proportions.*

For modelling purposes, you will find the following plan the surest and quickest, I fancy. (See Fig. 90.)

1. Draw a horizontal line on a board.

2. Take half the total height of the model (you will rarely have callipers big enough to take the total height), and measure it off on the horizontal line as A B, and with the distance A B as radius in your compasses, describe an arc from A through B.

3. Measure half the height of your framework; place one leg of the compasses on B, and with the other intersect the arc to get point C.

4. Join by a straight line points A and C, and your scale is ready.

You have only to apply it to your work, by striking an arc for every measurement, with A for a centre on lines A B and A C, and the distance from one point of intersection to the other will give you the proportional measure.

It will be well to strike the arc a little beyond the lines, so that you write on the outside whatever measurement it is. You will find this a very correct and rapid scale.

The same method is used for enlarging, but not for more than twice the size of the original.

Framework and Scale being ready, place the former on your stand, taking care to see that the stand is quite horizontal, and place the board with the scale on an easel close to you.

Now the model should be placed and posed on a turning throne, at such a distance from your work, that you get a good view of the entire figure.

As it always happens that by slow degrees the model loses the pose, owing to fatigue, it is advisable, that before the sitting you should well impress the pose on your mind and eyes, by trying it yourself. That will make you well acquainted with the points and force of the action, so that you concentrate your

efforts not to deviate from your lines when the model should do so.

It will be better to give the model a frequent rest for a few minutes, than to work from a tired model, as an experienced model will often, almost imperceptibly, transfer the weight of the body from one leg to the other ; and to a beginner the pose may appear to be the same, although the spirit of it is completely altered. This difficulty can be overcome by paying careful attention to the pose at the beginning, and by studying it, first on yourself, and then on the model, and thinking of it all along as your work proceeds, so that you have no need to change your work, except by emphasizing it more.

Fig. 91. Fig. 92.

Let us now begin our work, and take the action indicated in the diagram.

The first thing is to establish the *chief line*, which is the key to the pose. (Fig. 91.) We therefore stand right in front of the model, and, plumb-line in hand, take a vertical line from the centre of the *supra-sternal notch*, and watch where it passes the leg which carries the weight of the figure, which, in a pose like ours, will almost always touch the projection of the lower extremity of the tibia that is, the internal *malleolus*—or inner ankle-bone. (Fig. 92.) Then press a piece of clay on the

framework, midway between the shoulders, where you fix a point representing the top of the sternum, stand straight in front with your plumb-line, and adjust on the framework the pipe which represents the leg, so that it touches your line, leaving just enough space for a covering of clay, and allowing the pipe to be in the centre of the limb.

From the back view the chief line is indicated by the spinal column as far as it extends, and lower down by the general direction of the carrying leg. This line coincides in all its bearings or curves with the chief line of the figure, as seen from the front view. (Fig. 93.)

Fig. 93.

In sculpture the *posterior* chief line is more important than the *anterior* chief line, for we must consider the vertebral column as the central and fundamental part of the skeleton.

The different parts of the bony system are attached to it, either directly or indirectly, and from it depends the movement and the place of the pelvis. As for modellers, after the chief line of the back and of the front are settled, and for draughtsmen, the chief line according to the view they have to copy, they must both occupy themselves with *the lines of contrast*, presented by the action.

In this pose the side lines of the figure are parallel in their general direction to the chief or central line. If this central line is not exact, the exterior outlines cannot be so either; therefore you understand my assertion that the chief line is the key to the pose. (Fig. 94.)

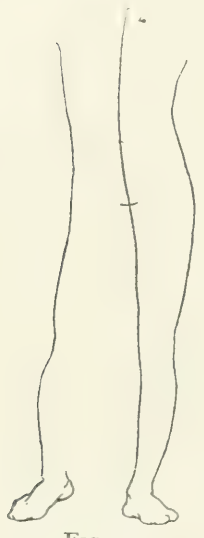

Fig. 94.

Now proceed to place the other leg of the framework into its pose, and observe your model well with regard to the *contrasting lines* caused by the action, and the *contrasts of projection.*

In a pose like ours you will find the following general rule:—

When the figure bears heavily on one leg, the Ilium on the same side is pushed up, for the tibia and femur preserve their entire length in the vertical direction and thus push the hip-bone up; whilst on the other side the Ilium is pulled down as both tibia and femur are bent forwards. The upper part of the body, in order to keep the equilibrium, tends to bend over on the side of the leg which carries, and thus the shoulder will on this side be lowered as compared to the other. Thus you get two contrasts of line in hips and shoulders, the line from one Ilium to the other going downwards, and the line from one shoulder to the other going upwards. (Fig. 95.)

Having observed this, you bend the pipes of the frame accordingly.

Now you turn your model, and note how these same contrasts obtain for the back. (Fig. 96.)

There is not only contrast between the shoulder line and the line of the posterior superior iliac processes, but also with

Fig. 95.

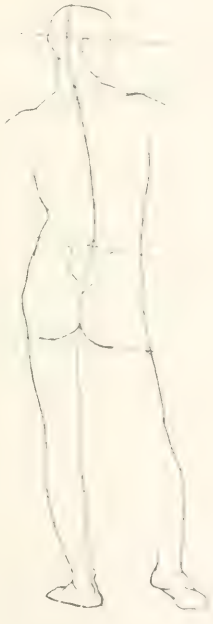

Fig. 96.

the line of the gluteus maximus; and further, in the leg you will find a contrast between the oblique direction of the bulk of the two gastrocnemius muscles and the lower extremities of the Tibia and Fibula—in other words, between the calf-muscles and

the ankle-bones (Fig. 97). Of course the same contrast exists in the front view.

Another thing: the head being turned towards the side of the free leg, it results that the face lies more or less in the same direction as the iliac processes, and consequently contrasts with the plane of the shoulders. (Refer to Figs. 95 and 96.)

Fig. 97.

There is another opposition or contrast between the shoulder and the hip: the *contrast of projection.*

Bearing on one leg, this leg not only pushes the ilium up, but also forward, whilst the ilium on the free leg goes backward, and the shoulder, which is already lower in line, moves back with regard to the shoulder above the free leg.

Thus you have two contrasts of projection, which must be marked on the framework by bending the pipes accordingly.

As the head turns in the direction of the non-carrying, or free leg, you get another contrast of line and projection with regard to the shoulders, indicated by the *line of eyebrows and ears*, and having indicated all these important lines and planes of contrast, you must think of the

action of arms and hands, in order to obtain the spirit of the pose from the beginning.

As concerns the leg, I might mention that you can fix a chief line as indicated in diagram, Fig. 98, by following the sartorius muscle from *its origin* at the anterior superior process of the Ilium *along its whole length* to the Tibia, and continue the line along the Tibia to the internal Malleolus.

When you have marked this chief line, you will note a marked parallelism between this and the general direction of the external outline of the leg; it is therefore an excellent guide to obtain the general shape.

I often, or almost always, see advanced studies (I am speaking of modellers) where the hands have been neglected, and sometimes they are not even indicated. This is a great mistake. It is impossible to enter into the spirit of the pose, or action of a figure, without putting in the position and action of the hands. It is by the place and relation to each other of the extremities, *i.e.* the head, the hands, and the legs and feet,

FIG. 98. — SHOWING THE CHIEF LINE OF THE LEG.

that all action is determined, and in the hands particularly you find the *intention* you want to express.

Every study ought from the beginning to be considered as a composition. If we set ourselves the task in our figure studies to express, according to the character and pose of the model some intention or feeling, this study will to the end command our attention, our enthusiasm and intelligence; and artistic feeling will grow in the place of mere patience.

You must, therefore, at once block in the extremities, whose position will determine the action of the rest of the body.

You cannot possibly model an arm properly, without having carefully modelled the hands in which you find the insertions or terminal points of most of the muscles of the fore-arm. It is therefore the natural continuation of the shape of the arm.

The same rule applies to the legs and feet.

I insist on this point, because I see it so often neglected. This neglect is just as ridiculous as it would be to cover a drawing with a sheet of paper with a small hole in it, to enable the draughtsman to see nothing but the head, and to stipple away at it with tiny pencil strokes, without having the whole figure before his eyes—in fact, with the figure only outlined. I have seen such things done!

From the profile the chief line is given by the *direction of the sternum*, the *outline of the pelvis*, and the general direction of the *anterior contour of the carrying leg*. (Fig. 99.)

There are persons, whose vertebral column has a more graceful curve than those of other people; in such cases the chief line of the profile has more movement than that of a straighter-built person.

To find the direction of the pose from the profile view, you must again use your plumb-line, and hold it so that it will cut through the centre of the neck, as seen sideways; then observe where it will pass with regard to the outer malleolus of the standing leg. (See Fig. 99.)

Fig. 99.

Another matter you must pay attention to is, that the pipes are not crooked, but very straight in the big lines and very neatly bent at the joints,—you might even give them the exact curves of the femur, tibia, humerus, and ulna—that is, if you can! This would give a certain expression and resemblance to the skeleton already in the framework, and would render the work spirited from the very beginning, and at the same time more tempting and encouraging.

When, on the other hand, the framework is made carelessly, the pipes loosely joined and crooked, the clay stuck on anyhow, &c., the material difficulties are enormous from the beginning, and the discouragement complete.

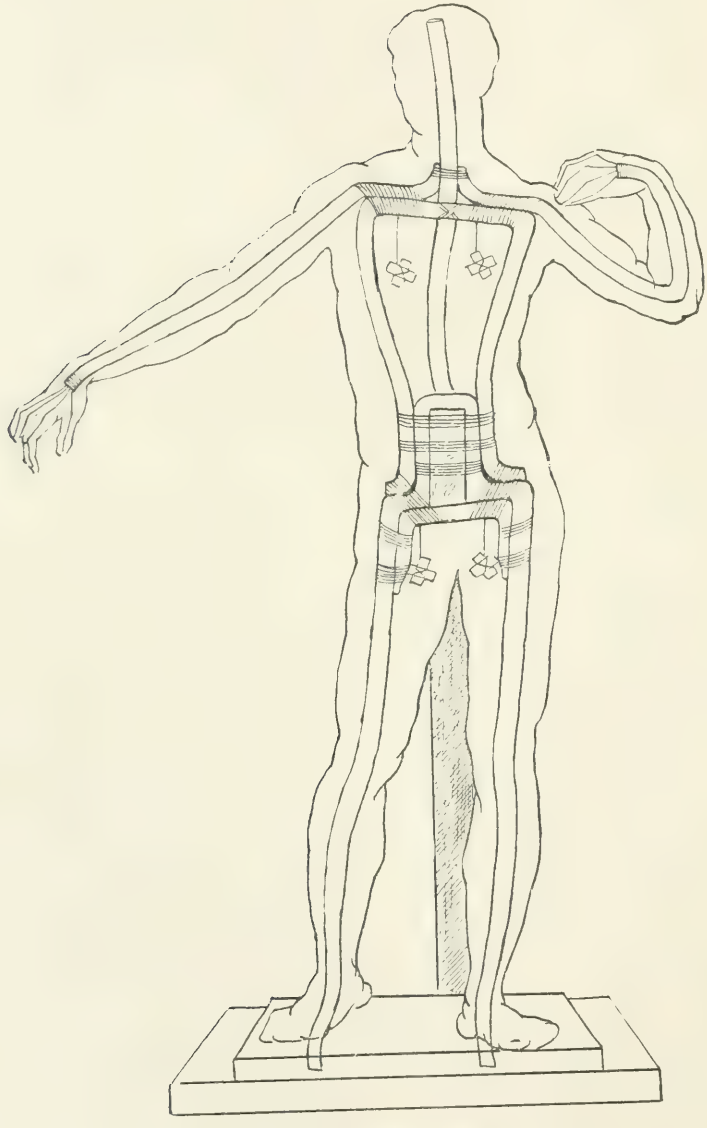

Fig. 100.—Armature in Action.

Let me caution you, therefore, to bestow the greatest care and attention on all the preliminaries.

When the armature or framework has been put into the pose or movement (Fig. 100), cover it all over with a slight layer of clay, just sufficient to mark the chief lines of contrast and projection, as shown in Figs. 101 and 102.

The plinth of clay should now be made, and be at least three inches thick, so that, if it is necessary to lengthen the limbs, one may do it in the downward direction by lowering the plinth, without having to destroy the rest of one's previous work.

On this plinth of clay it is well to fix a small piece of wood, well towards the centre, so that it will give a firm point for measuring.

Starting now from the supra-sternal notch, we draw on the clay the central line of the figure.

This will pass along the centre of the sternum, then continue along the *linea alba*, following the curve which the action of the figure causes, through the *umbilicus* or navel, and down the internal contour of the leg which bears the weight, to the Malleolus internus.

It is best to exaggerate the curves of this line, as one is liable to creep back towards the vertical.

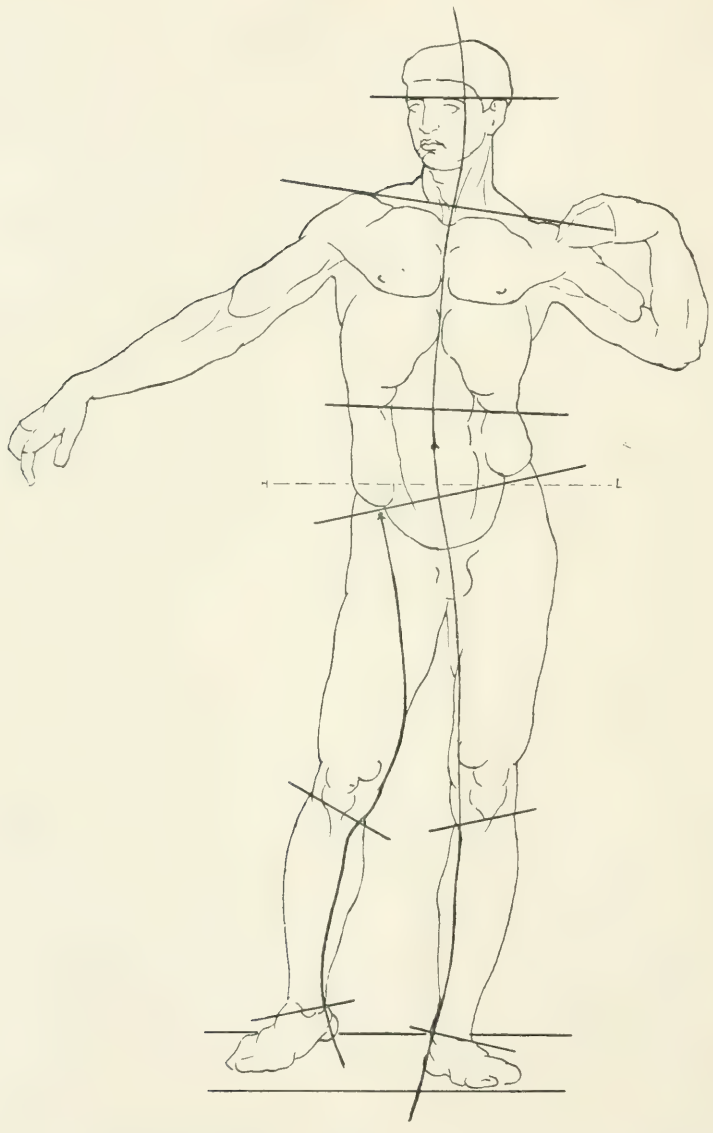

FIG. 101.—FIGURE SHOWING CHIEF LINE AND LINES OF CONTRAST.

The line HL is a horizontal line drawn through the anterior superior iliac process of the standing leg.

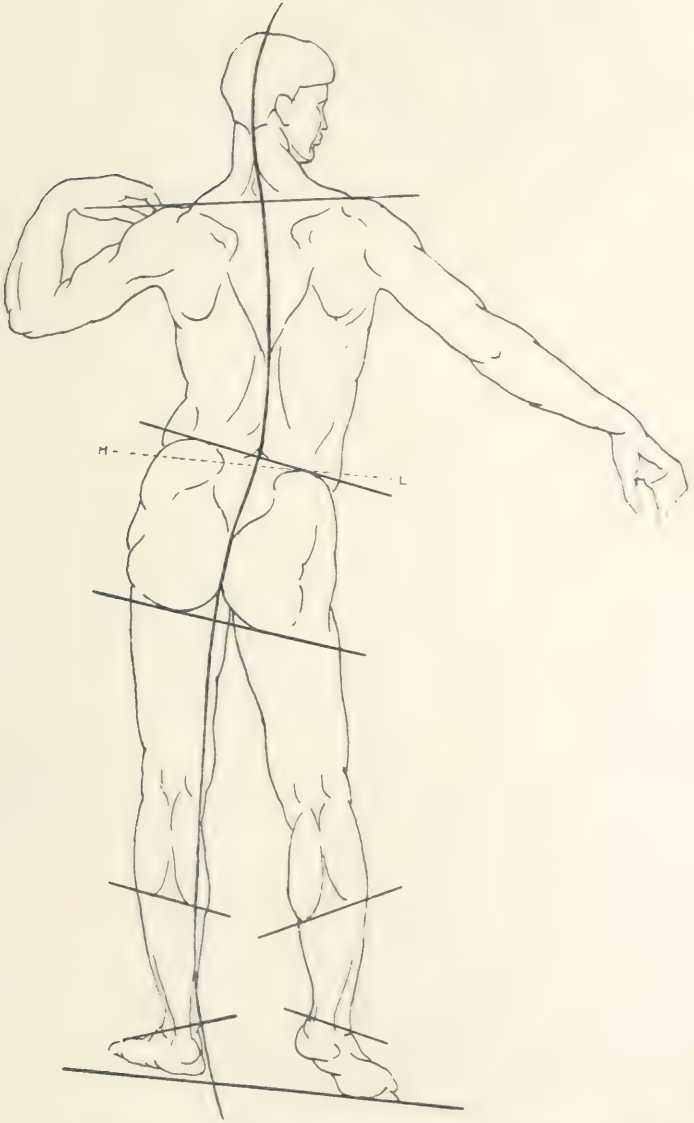

Fig. 102.—Figure showing Chief Line and Lines of Contrast.

FIGURE MEASUREMENTS

You must not take the following measurements before being quite sure of having the pose correct, for the measurements do not assist you to find the pose, but only help you to find the construction. (Fig. 103.)

1. The first measurement to be taken for the figure is the distance from the plinth, *i.e.* from under the arch of the sole of the standing leg, to the upper border of the Patella.

2. The second from the top of the Patella to the anterior superior process of the ilium of the same standing leg. (Fig. 103.)

In order to fix the deviation from the vertical of the anterior superior iliac process, place yourself opposite the model, and take with one hand the plumb-line through the centre of the Patella, whilst with the other you measure the distance from this vertical line to the iliac process.

Only when you have found this distance take the measurement, and fix the point, after observing also very carefully from the profile view the projection of the iliac process in relation to the Patella.

3. The third measurement is the distance across the pelvis from one iliac process to the other. (Fig. 103.)

Before you fix this, you take a horizontal line, starting from the anterior superior process of the ilium in the *standing* leg, to

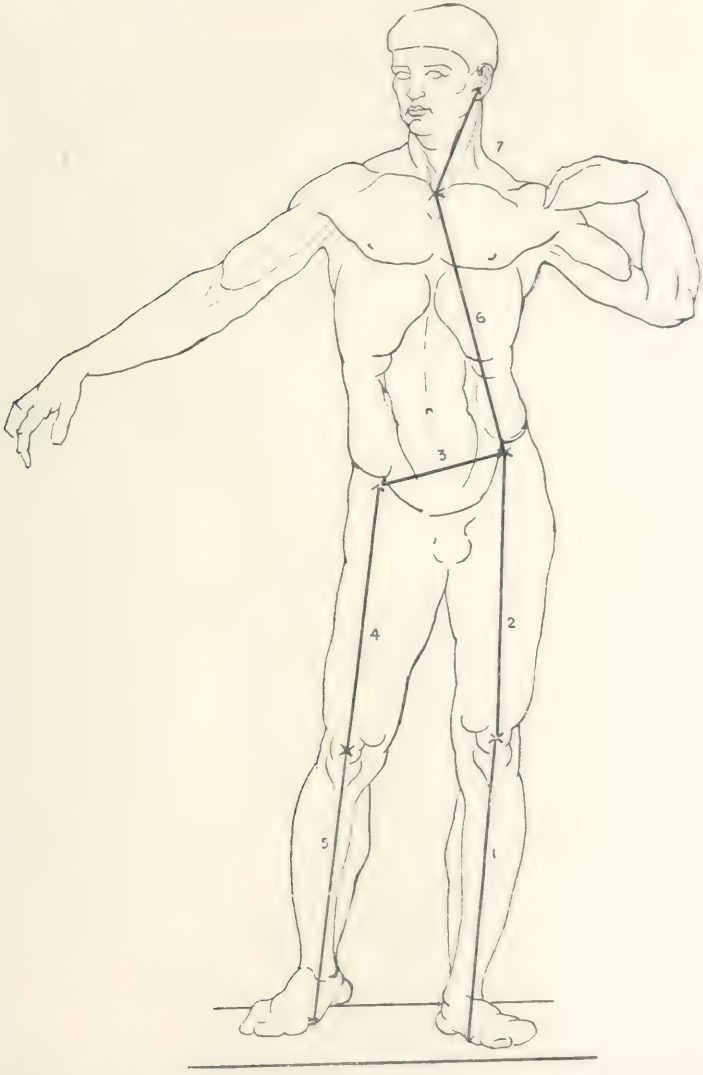

FIG. 103.—FIGURE SHOWING THE ORDER OF MEASUREMENT.

1. From Plinth to top of Patella.
2. From top of Patella to Anterior Superior Iliac process.
3. Space between the Anterior Iliac processes.
4. From Anterior Superior Iliac process to top of Patella in free leg.
5. From top of Patella to Heel.
6. From Iliac of standing leg to top of Sternum.
7. From Sternum to Ear.

ascertain how much lower than it the ilium of the *free* leg is, and having noticed this difference, fix your point. (Fig. 101.)

4. The fourth measurement is from the iliac process of the free leg to the top of the Patella of the same leg. (Fig. 103.)

FIG. 104.

8. From Anterior Iliac process to Posterior Iliac process.

9. From top of Sternum to Seventh Cervical Vertebra.

5. The fifth measurement is taken from the top of the Patella of the free leg to its heel. (Fig. 103.)

6. The sixth measurement is from the iliac process of the standing leg to the top of the sternum, *i.e.* the supra-sternal notch. (Fig. 103.)

7. For the seventh measurement take the distance from the supra-sternal notch to the ear, *i.e.* the notch between Tragus and Antitragus. (Fig. 103.)

8. For the eighth measurement take the distance from the profile of the standing leg between the Anterior Superior and the Posterior Superior Iliac Processes. (Fig. 104.)

To obtain this correctly, you must again use a horizontal line, starting from the Anterior process, in order to see how much higher the Posterior Process is in relation to the former.

This measurement must also be taken on the free leg.

Fig. 105.

10. Space between Posterior Iliac processes.
11. From Posterior Iliac process of standing leg to Seventh Cervical Vertebra.
12. From Acromion process to head of Ulna.
13. From head of Ulna to first articulation of Finger (index finger).

9. For the ninth measurement take the distance from the Supra-Sternal Notch to the seventh Cervical Vertebra. (Fig. 104.)

Before fixing this measurement, you must, in the same way as for the iliac processes, obtain a horizontal line from the top of the Sternum, to ascertain how much higher the seventh Cervical Vertebra lies than the Supra-Sternal Notch.

10. The tenth measurement concerns the distance between the two Posterior Superior Iliac Processes. (Fig. 105.)

To obtain it correctly, you again apply a horizontal line, and note how much lower the process on the free leg may be, than on the standing one. (Fig. 102.)

The four points obtained by measuring the Iliac Processes must be fixed and verified with the utmost care, because upon them depends to a great extent the entire construction, not only of the torso, but of the whole figure. They are, architecturally speaking, the *plan* of it.

11. The eleventh measurement is from the Superior Posterior Iliac Process of the standing leg to the seventh Cervical Vertebra. (Fig. 105.)

12. Take the twelfth measurement from the Acromion Process to the head of the Ulna on both arms. (Fig. 105.)

13. Take the thirteenth measurement from the head of the Ulna to the first articulation of the index on both hands. (Fig. 105.)

It seems almost needless to add that during the course of the work you must constantly verify these measurements, for it happens only too often that in modelling you gradually cover them with clay, until the construction has almost disappeared, and your distances begin to change without reason. As a result, your work becomes disappointing, and the worker tires himself out without obtaining a satisfactory result.

I have aimed at sparing the student such a painful disappointment by introducing into the study of the figure a positive system, based on anatomical construction.

I lay stress on the fact that the measurements I have given you, and shown in diagrams, are of the greatest importance. You may, as your work proceeds, take many others which you consider a help to your work, but let me warn you against taking mere flesh-measurements. They are misguiding, and you can only rely on the measures taken from bone points.

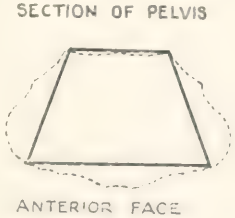

FIG. 130.

But I must dwell particularly on the measurements of the four Iliac processes, which give a section of the Pelvic Girdle, and on the correctness of which I cannot insist too strongly. Fig. 106 shows you this section, which is also the *plan of the torso*.

If these four points on the Ilium, which in their relation to each other *never* vary, are not correct, neither can the con-

struction of the torso be right, nor will the legs come in their proper places.

The measurement from the top of the sternum to the seventh Cervical Vertebra gives us the depth from front to back of neck, two points which are placed above the section of the pelvis. (See Fig. 107.)

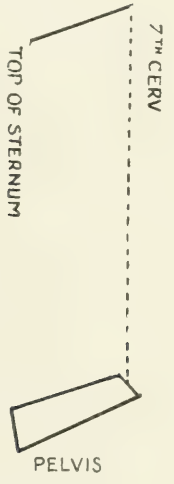

Fig. 107.

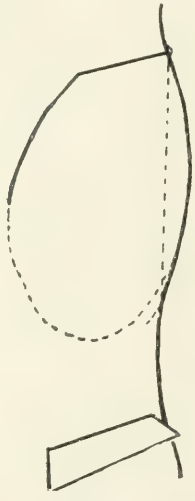

Fig. 108.

These four points in their oblique direction, viewed from the front, extend or contract the muscles of the back and of the front of the torso; the muscles on the side of the standing leg will be contracted, while those on the side of the free leg will be extended.

(Fig. 108.) The place of the seventh cervical being fixed, it must be joined through the curve of the vertebral column

(which varies in different persons, as already pointed out) to the pelvic girdle. (Fig. 108.)

In observing the movement in the Lumbar region, you will find that the pelvis is at right angles with the Lumbar Vertebræ.

As I have already said, the vertebral column must be considered as the central and fundamental part of the skeleton. It is composed of twenty-four vertebræ :—

7 Cervical,
12 Dorsal,
and 5 Lumbar
} Vertebræ.

The movement of the column is always found in the Cervical and Lumbar regions. (See Fig. 109.)

The Dorsal Vertebræ have little movement, for they have to support the bony cage formed by the ribs—*i.e.* the Thorax—in an almost rigid state to protect the organs of breathing and circulation lodged within it.

The bones of the upper part of the column, *i.e.* the Cervical Vertebræ, support the Cranium.

To the lower part of the vertebral column the Pelvic Girdle is attached ; it almost forms part of it, owing to the fusion of the hip-bone with the Sacrum or Coccyx.

It is to the Pelvic Girdle that the bones of the lower extremities, the legs, are attached.

It follows that the most important points in constructing a figure are, to find the relation between the two Anterior and the

two Posterior Iliac processes, between the Supra-Sternal notch and the seventh Cervical Vertebra.

Imagine the sections of these two lying above each other and joined by the vertebral column. The movement of the latter takes place immediately *above the sacrum* in the *lumbar* region, and again *above the seventh Cervical Vertebra;* the latter determine or guide the direction of the head.

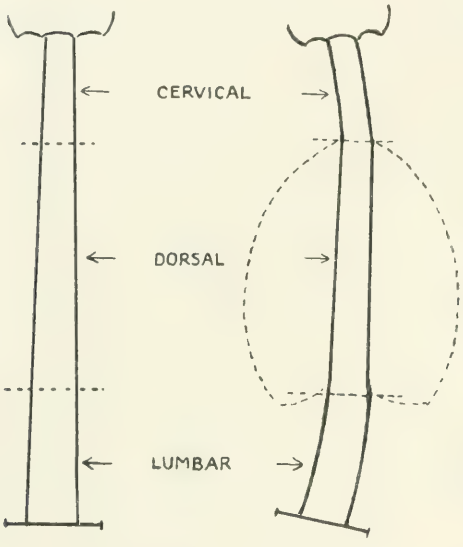

Fig. 109.

When you have fixed these points, you must find from the profile the *projection of the sternum*—that is to say, its *oblique direction forwards and downwards*—in order to ascertain the depth from the front to the back of the thorax. You then complete the body of the thorax in joining the vertebral column to the sternum by means of the ribs. (Refer to Fig. 108.)

Whatever the pose of your figure may be, remember that the thorax is always *equally balanced* on both sides of the sternum, and its shape is almost invariably symmetrical. However oblique the sternum and the dorsal vertebræ may be, we

must build up the thorax equally on either side to bring it up to the volume of the model. (Fig. 109.)

If you draw a line below the costal margin (which is at right angles to the sternum), you will find this symmetry very striking, and you obtain at the same time another contrast with the crest of the ilium.

Fig. 110.

The line of the shoulders is generally parallel to the lower border of the thorax (refer to Fig. 101); even in the pose which I have chosen for demonstration, you will find that a line joining the two acromion processes is almost parallel with the border of the ribs (it is the *muscles* of the shoulder which follow the raised arm, the shoulder itself is hardly raised).

The symmetry of the thorax on both sides of the vertebral column and the sternum exists in all the movements of which the human figure is capable, and as the flat muscles attached to the thorax follow its shape (refer to Fig. 110), it results naturally that, unless the bony cage is correctly established, there will be

a want of order and harmony in the position of the muscular forms.

There is another section which will assist us greatly in our modelling of the figure: it is the section through the two Clavicles, the Scapulæ and the Vertebral column. (Fig. 111.)

This section, like the one through the Pelvis, will help us to find the volume of the upper part of the torso, the roundness of

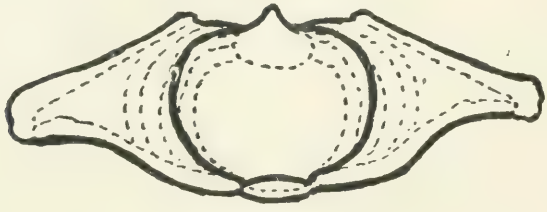

Fig. 111.

its outline, and the right place for the neck, which must be well placed in the centre.

In students' work the clavicles are often blocked in like two straight bones, instead of their giving them the shape of the letter S. If they are made too straight, the pectorals appear flat and the shoulder comes too far forward, which gives the appearance of low relief on a round shape. By carefully studying the section of the collar-bone you will avoid this effect. Observe, therefore, intelligently the form and drawing of the Clavicles, as well as their symmetry, and study at the back the position of the Scapulæ which follow the action of the arms.

This will give you the upper plan of the trunk, just as the section of the pelvis gives you the lower plan, and if you have these two plans well in their right place, the *limbs* will of course find their right place.

I have stated before that in beginning a piece of sculpture you must avoid putting on too much clay, and rather keep your study thin so that you can add to it; but as soon as the pose is settled, you must determine the exact proportions of the bones, their extension in length, and—as far as thorax and pelvis are concerned—also their extension in depth and breadth. For they are not only *invariable points*, but also determine the action and the division of the forms and masses. They are the landmarks of the torso, they are architecturally-speaking the framework of the house.

By fixing all the prominent points of the bones in their proper proportions of length and width, and in their right place as regards the movement, one obtains the foundation of the figure, the points of origin and insertion of the muscles. Our knowledge of Myology and exact drawing will then join the separate parts together into a harmonious *ensemble*.

In laying the clay on in the direction of the planes which the muscular fibres present, and by drawing, we evolve out of

the general form the particular character of the form of the model before us.

The influence of the curved form of the bones makes itself felt in all the limbs of the human figure. The muscles, more or less fleshy, always follow the curve, and you might truthfully say that the curves of these bones give the cue to the shape of the leg as well as to the shape of the arm.

FIG. 112.—SHOWING THE INFLUENCE OF THE HUMERUS AND ULNA ON THE ARM.

Fig. 112 shows you how the form of the Humerus and Ulna influences the form of the arm.

Fig. 113 proves how the Femur and the Tibia influence the shape of the leg from the profile, as well as from the front view.

Figure to yourself a student ignoring the curves of these bones. What will happen to his work? He will place form upon form without any principle, and his work will be heavy, without charm and clearness: I can only compare it to a piece of ornament which lacks a chief line, where every detail, be it flower or leaf, is placed by chance, regardless of a definite law of direction, and the result is confusion.

A thorough knowledge of *Osteology* from my point of view is more important than that of *Myology*, for the skeleton determines the movement, the proportion and construction of the figure, and its careful study is indispensable to the study of external forms.

I repeat what I said in Chapter I.: *Anatomy teaches us the general law of the human form, whilst the living model shows us the same laws applied and modified by individual characteristics*, which we have to express by drawing.

But remember that all models, whatever their age and sex, will always have the same bones and muscles, with the same attachments.

In the study and knowledge of Anatomy the student will therefore find a positive guide to the general facts, although the anatomy of every model will present some different aspects and individual characteristics. It is these individual characteristics in their infinite variety, which the artist must endeavour to express.

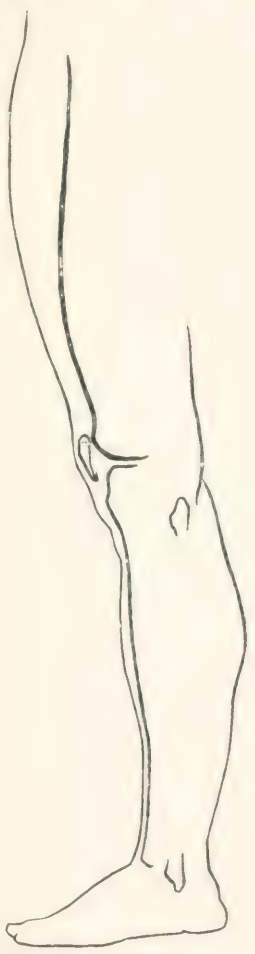

FIG. 113. — SHOWING THE INFLUENCE OF THE FEMUR, TIBIA AND PATELLA ON THE LEG.

It should, however, not be imagined that the knowledge

of Anatomy would suffice to make a work of art : far from it. It is only the handmaiden of art ; it is the means by which we understand the cause of form and shape, and it helps us to put clearness, strength, and expression into our studies.

A figure, therefore, in which one had only applied anatomical knowledge, without observing the particular characteristics of the model, might be a scientific piece of work, but it would never possess any artistic merit.

In order to well represent objects *such as they appear*, it is important that you should know them *such as they are.* You can only see correctly with your mind's eye, and a form which you may have drawn, without understanding it yourself, you cannot hope to make clear to others. I have seen this very well expressed, although I do not recollect where :

"The ignorant look, the intelligent see."

To copy Nature, you must observe and understand her.

At the beginning of our studies, in drawing as well as in sculpture, we must understand the *Geometry* of the figure, which is *real* and *permanent*, without regard to the visual alteration when seen foreshortened.

Take as an example the capital of a column. You see it foreshortened, and yet you know it keeps its positive proportions, its height, width, and volume—in other words, its geometric construction. If you ignore this geometric construction, you

will hesitate and be doubtful from the beginning about the choice of the points to be fixed.

I now draw your attention to the movement of the muscles of the Abdomen, *i.e.* their *contraction* on the side of the standing

Fig. 114.

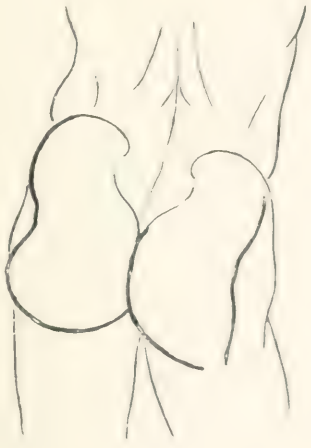

Fig. 115.

leg, their *elongation* or extension on the side of the free leg. (See Fig. 114.)

A similar contraction is evident in the Gluteus muscle of the standing leg, and a similar elongation of the same muscle in the free leg. (Fig. 115.)

I have tried thus far to impress you with the importance of the *chief lines* of the figure, as well as with the *contrasts* of *line* and *projection* in the movement of the figure, and how necessary it is, not only in this pose, but in any and every action that we want to represent, to discover these lines and apply ourselves to their study.

The next task we have to set ourselves is to study the contrast in the character of *form*, in the direction of the planes presented by the muscles and their fibres, which cover the skeleton, and which play such an important factor in the exterior form by giving it mechanism and expression.

A certain law exists in every object of nature, which, for want of a more expressive term, I might call the *law of radiation* —that is, the *tendency of all lines to converge to one central point*, or, if you like it better, the *divergence of lines from one central point*. Such central points are not only found in the human form, but also in drapery, in leaves, flowers, trees, &c.

Let us observe the Deltoid and great Pectoral muscles. We find that these two large muscles are inserted almost at the same place on the upper arm, and that thence the muscular fibres separate like rays to their respective attachments or origins,—the Deltoid to the Clavicle, Acromion, Scapula, and spine, the Pectoral to the Clavicle, Sternum, and fifth rib.

These two muscles alone, radiating from one point, go a long way towards covering the trunk, and the movement of

their planes and their radiation make a striking contrast with the vertical direction of the parallel fibres of the Biceps muscles. (Fig. 116.)

If you observe the general direction of the muscular fibres in the Torso, you will find those of the pectorals attaching themselves to the upper part of the Torso, to the Clavicle, and that *gradually* they descend to the Sternum and to the fifth rib.

Fig. 116.—Showing contrast of the Fibres of Biceps with radiation of Pectoral and Deltoid.

Also that those of the Serratus Magnus and of the External Oblique follow this downward direction, and attach themselves to the lower part of the Torso, on the Ilium.

Here there is also radiation, and in direct contrast to it are the muscles of the Abdomen, the fibres of which are vertical in their direction, like those of the Biceps. (Fig. 117.)

These contrasts of direction exist in a more or less accentuated degree in the whole figure, and it is by observing them that one adds to the expression of form. For this very reason, it would be foolish, if, in our studies—whether they be of sculpture, painting, or drawing—we aimed at a smooth texture

more or less agreeable to the eye ; we should, on the contrary, analyze the forms we see, and search for their cause before we represent them. Our study ceases, when by some trick we

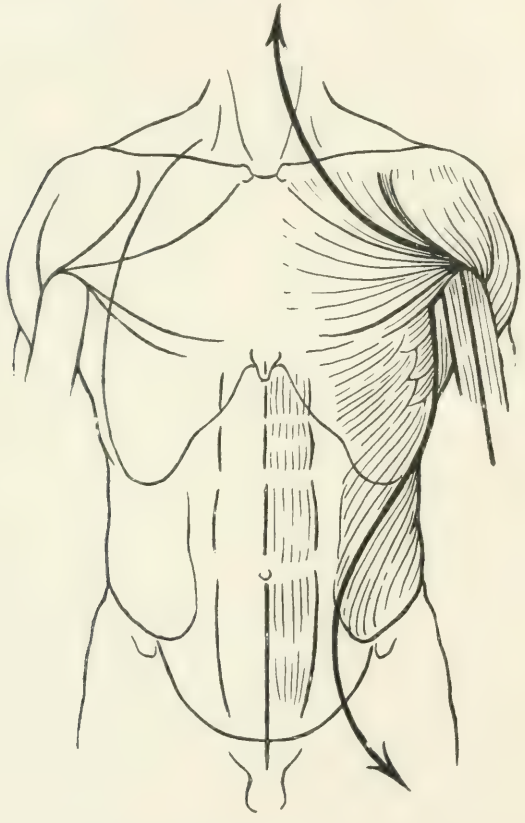

Fig. 117.—Showing the contrast of the Abdominal Muscle with the radiation of Pectoral, Serratus Magnus and Oblique.

polish the clay, or try to give colour, or in a drawing produce velvety shading. It is lost time, utter waste of time! You

may spend your life in working like this, and you will never make any progress. You must on the contrary, so to speak,

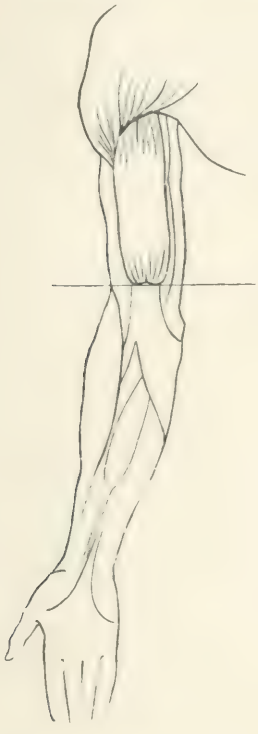

Fig. 118A.

Fig. 118B.

Fig. 118A.—Showing the appearance of the Arm when the Lower Border of the Fibres of the Biceps is at Right Angles to its Axis.
Fig. 118B.—Showing the oblique direction of the Attachment of the Fibres of the Biceps.

dissect the form, and penetrate it in order to understand it. A pleasing surface will come in a later stage.

I should like also to mention two matters of minor import-

ance, but still of importance, which I have very frequently seen neglected. I refer to the arm and particularly to the Biceps and Triceps. The fibres of the Biceps do not merge into the tendons of insertion all at once in a horizontal line, but join it in an *oblique* direction from the outer to the inner side, thus making an agreeable contrast with the vertical direction of this muscle. The oblique, flattened plane, caused by the tendon of the Biceps, is still enforced on the inner side of the arm, by the tendon of the Brachialis Anticus, and should be well indicated. If this obliquity is neglected, the effect is very heavy and architectural. (Fig. 118 A and B.)

The tendon of insertion of the Triceps does not exactly follow the line of the Humerus, as I frequently see it represented, but goes obliquely from inwards to outwards, and thus we have another contrast between its direction and the general direction of the arm. (Fig. 119 A and B.)

In Drawing as well as in Modelling you must endeavour to give expression to the great variety of character which exists in the different parts of the human body. It is evident that the diversity in hardness and rigidity, which exists between the bones, cartilages, tendons, muscles, and fatty parts, will produce different effects on the surface form covering them.

By observing this diversity you will avoid the particularly objectionable effect of a drawing looking as if it had been made after a figure composed of cotton-wool.

In the upper arm you will find that the forms are rounder and fuller than those of the fore-arm, for in the former the

Fig. 119A.

Fig. 119B.

Fig. 119A.—Showing the appearance of the Arm when the Tendon is in the same direction as the Humerus.

Fig. 119B.—Showing the oblique direction of the Tendon of the Triceps.

tendons are short in comparison to the fibrous or fleshy part of the muscles, whilst in the latter the tendons are long and extend over a large surface.

The same remark applies to the lower extremities. The thigh shows rounder and fuller forms, whilst in the leg the bones and tendons are visible.

In the trunk you observe that the Thorax has greater complexities in the movement of different forms, and a greater solidity of appearance than the abdominal part, which is not closed in by bony structure, but by vertical muscles. This difference of character gives great force to the Thorax, and makes at the same time a welcome change and rest between the thoracic part and the pelvic girdle. The bony structure reappears on the surface in the crest of the Ilium (in the Iliac furrow) and the lower part of the trunk takes again the aspect of solid construction.

These contrasts, *i.e.* the strong structures of Thorax and Pelvis, separated by the soft and flat muscular mass of the Abdomen, impress on us the fact, that all the movement of the Torso must take place in this soft and flexible middle part, which coincides with the Lumbar Vertebræ, the movable parts of the Vertebral Column.

An antique figure which shows to perfection this contrasting character of Thorax and Abdomen is the Ilissus. The movement is of an incomparable suppleness and accuracy, and the abdomen is rendered in the marble with a knowledge that cannot be too much admired. Its volume is moderated and held back by fibres, which appear neither too loose nor too

soft, and yet have a marvellous elasticity. The abdomen forms one great mass, over the flatness of which the vigorous construction of the thorax predominates.

The whole of this admirable fragment has evidently been conceived and drawn with one impulse, with one inspiration, so that everything is in harmony with the rest, and although the head is missing, the body is still a marvel of expression.

I can affirm, without hesitation, that it is the finest piece of sculpture in existence, and that one cannot find a more perfect model to study from.

I shall not further insist on the differences or contrasts in character or style of drawing, feeling certain that, having drawn your attention to a few, you will readily find other parts and points where such contrasts of form and character of drawing exist.

I will now draw your attention to a principle which the Old Masters have sometimes exaggerated, and done so with full intention, for the artistic advantage of their works. I refer to what I might call *Spaces of rest* between the masses. These neutral spaces give to the whole figure, as well as to the separate parts, suppleness and distinction.

Nothing is so hard—and consequently rare in Nature—as two big masses, which, at the point of meeting, form a more or less acute angle.

Let us take for an example an arm in profile view. If the

outline of the Deltoid makes an angle where it meets the Biceps, and if the Biceps, lower down, where it meets the mass of the Supinators, makes an angle, it will look heavy and lack spring. (Fig. 120.)

When, on the other hand, you exaggerate the principle which I mentioned, and separate these large masses by a narrow plane

Fig. 120.

Fig. 121.

Fig. 120.—Showing the Arm in the same position without the "Points of Rest."

Fig. 121.—Diagram showing the "Points of Rest" in the Arm.

of rest, you obtain much more spring and elegance in the form and especially more refinement. (Fig. 121.)

You will find this principle, not only in the outline of the arm, but just as much between the muscles of the face, and in all the other parts of the body. (Fig. 122.)

A large mass is always, in a more or less accentuated way,

separated from another by a line or slightly curved plane which I call a rest. Not only in the outer *contour*, but also in the *sections*, do we find this principle applied.

For instance, if we take the section of the chest, we find the flat plane of the sternum separating the large masses of the Pectorals, just as the vertebral column separates the masses of the lumbar muscles. (Fig. 123.)

If, instead, the two Pectorals were attached to the centre of the sternum, and the lumbar muscles to the centre of the spinal column, the section would lack elegance and strength (Fig. 124.)

Fig. 122.—The Torso with the "Points of Rest."

Wherever the bones appear on the surface, or rather are *subcutaneous*, there is a certain firm rigidity of drawing which impresses on us the fact, that underneath the muscles there is the solid framework of the bones which support them, and on which they depend completely.

These points of rest, on the outline as well as in the sections, are generally caused by the bones or the tendinous

parts, which are more rigid in drawing than the muscles. Therefore, these firm, slightly-curved flatnesses, which the subcutaneous bones cause, form, by their tranquil simplicity of aspect, a contrast to the variable alternative roundness of the muscular fibres, and give an impression of resistance, which at the same time detracts from the monotony which would exist, if an even roundness of form prevailed all over the figure.

In the beautiful antiques, especially in the Torso Belvedere of the Vatican, you observe the application of this principle.

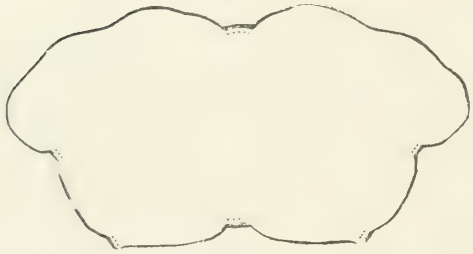

FIG. 123.—SECTION OF THE THORAX WITH "POINTS OF REST."

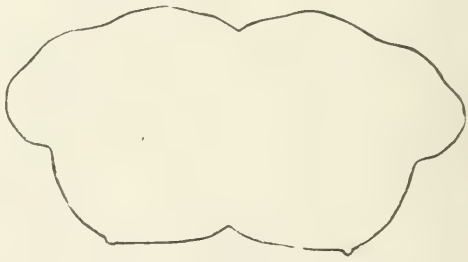

FIG. 124.—THE SAME WITHOUT THE "POINTS OF REST."

It is not only in the outlines that this is evident, but these intervals of rest show in a more or less emphasized manner between all the large muscles, so that, notwithstanding the enormous muscular development of this torso, it remains elegant, elastic, and supple.

I therefore repeat and impress on you that these intervals of rest, or planes of separation, between the masses occur in every part of the figure; and I am convinced that, having drawn

your attention to this principle, you will see it and apply it yourselves in all the other parts which I have not mentioned.

To model does not merely mean making a model of a statue; this term applies as well to the product of Painting as to that of Sculpture. We talk of good and vigorous modelling and weak, poor modelling of heads, hands, &c.

In Painting, the beautiful modelling depends on *drawing* and *colour*: it signifies rendering by means of light and shadow the round or flat projections of a solid body.

In Sculpture, it depends on understanding and drawing with intelligence the often slightly-curved half-planes, an intelligence which can only be acquired by a thorough knowledge of the anatomical mechanism which lies underneath the skin; for it is the movement of the muscles and their fibres, which in their contrasting directions form the large variety of planes which the skin covers, enveloping and following them in all their undulations.

The ignorance of Anatomy in this, as in the construction of the figure, can only produce in the execution a result which is weak and unintelligent, and consequently uninteresting.

Besides, he who is ignorant of it, cannot so clearly see these movements of planes on the surface, as he who knows it. Even if he sees them, he will never give them such animation,

strength, and feeling of delicacy, for he does not know the origin of these planes, nor their cause.

In order to model a form, it must be drawn first by the shadows or half-tints which surround it. These are formed by the, more or less rapid, action of planes, whose place or point of origin is narrow, but which spread by radiation over the large surface of the form.

Let us take the Pectoral for an example.

Its modelling cannot be obtained by a mere slightly curved plane which surrounds it and draws its outline. If you stopped at that, the result would look like a lifeless board, or, if you simply rounded it off, it would look like a cushion stuffed with cotton-wool, without the "morbidezza" of nature.

On the other hand, with regard to these shadows, if you boldly and wisely indicate in them the starting of the numberless planes which surround them, by spreading them and again modelling them together on the larger surface, you will obtain an expressive form and a great variety of movement.

When all these movements of planes are blocked in, they must be blended together by the skin which delicately covers them, by simplifying them, by almost making them disappear, and by these means you will obtain an *animated simplicity*. The opposite proceeding can only result in a *dead simplicity*.

In working out these planes, you should never forget to separately observe from below, or from the side, the section of

each separate form, in order to give them their richness of form.

If you worked only from the front, the result would certainly be a poor and flat form. By working across the form you will be obliged to look at it from underneath, and thus give it fulness and richness.

In this stage, more than ever, you should compare the relative values of half-tints and shadows, for it frequently happens that, in indicating the planes before-mentioned and their radiations, the half-tints which draw the form are *almost of equal value.*

At this point, when a shadow appears too black, it does not always mean that the depression is too deep, but the cause is rather found in the fact that the angle formed by the light and shade is too acute.

Or, if it is not dark enough, that the angle is too obtuse.

The study of these angles is very important. You can only arrive at them by the section of the form—that is, by looking at it from underneath.

To obtain a strong shadow it is not necessary to make a hole, but to make the angles more or less sharp.

The Palette of the sculptor is made up of black and white, and all the different tones are formed by the variety of the angles which give light and shade.

You should never make the half-tints which surround a form too narrow—that will rob them of breadth; for the richness

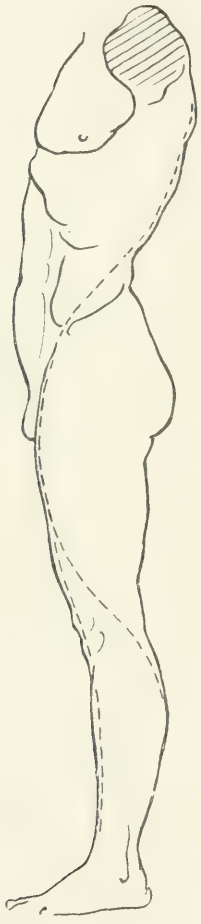

Fig. 125.

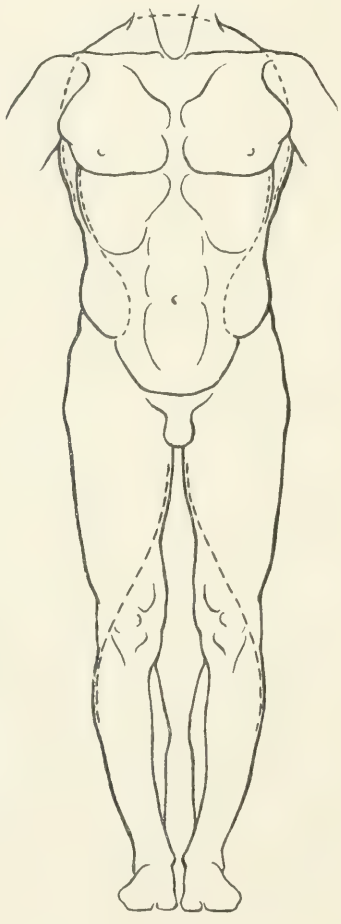

Fig. 126.

and breadth of form depends absolutely on the half-tint which surrounds it.

If you must exaggerate, it is preferable to make these half-tones rather too large, for that will give not only richness to the form, but will produce separation between the various forms, which will give more life and spring to the whole.

In drawing an outline you should mentally continue it to the point which it may meet on the other side of the figure.

Fig. 127.

Fig. 128.

Take, for instance, the general direction of the outline on the profile, caused by the Shoulder-blade and the Quadratus Lumborum, and continue across the figure to observe its relation to the general outline of the leg. (Fig. 125.)

Do the same for the outline of the Trapezius muscle, to find its relation with regard to the dorsal (Latissimus dorsi). (Fig. 126.)

Continue the outline of the thorax from the front view with regard to the internal and external oblique muscles. (Fig. 126.)

Continue the anterior outline of the carrying leg along its posterior outline. (Fig. 125.)

Observe in the arm the relation of the Deltoid to the posterior outline of the fore-arm. (Fig. 127.)

These lines may be traced or drawn on all the views of the figure—as, for example, on Fig. 128 ; by means of this, the general relation of form to form will be ascertained, and you will get harmony of lines at the same time as their movement ; you will avoid a piling-up of forms without any relation between them.

It is, so to say, in oblique lines the equivalent of the horizontal and vertical lines, which you employ to find the position of different points on the figure.

And you might trace such lines *ad infinitum*. I only mention a few, feeling certain that, if a student has once grasped this principle, he will find many others by himself.

COMPARATIVE PROPORTIONS

I am much averse (in our studies from the living model) to the application of rules of proportion which some books give us, which teach that so many noses, or so many fingers, compose the length of an arm or a leg.

If we applied this information to our studies from Nature, it would destroy in our work the character and individuality which every being possesses, and the result would be very commonplace work ; for it is just the *proportions* which lend individual character to the head, as well as to every other part of the figure.

Nevertheless, I believe that it is useful to know certain *comparative proportions*, which will enable us, in making a sketch or composition, to avoid gross mistakes.

I have indicated a few such in a diagram of comparative proportions. (Fig. 129.)

In the following measurements we observe a minimum of variation or difference :—

In the Leg—The distance from beneath the arch of the foot to the upper border of the Patelia is equal to that from the centre of the Patella to the Crest of the Ilium on the standing leg.

But I have also found, in rather long legs, that the

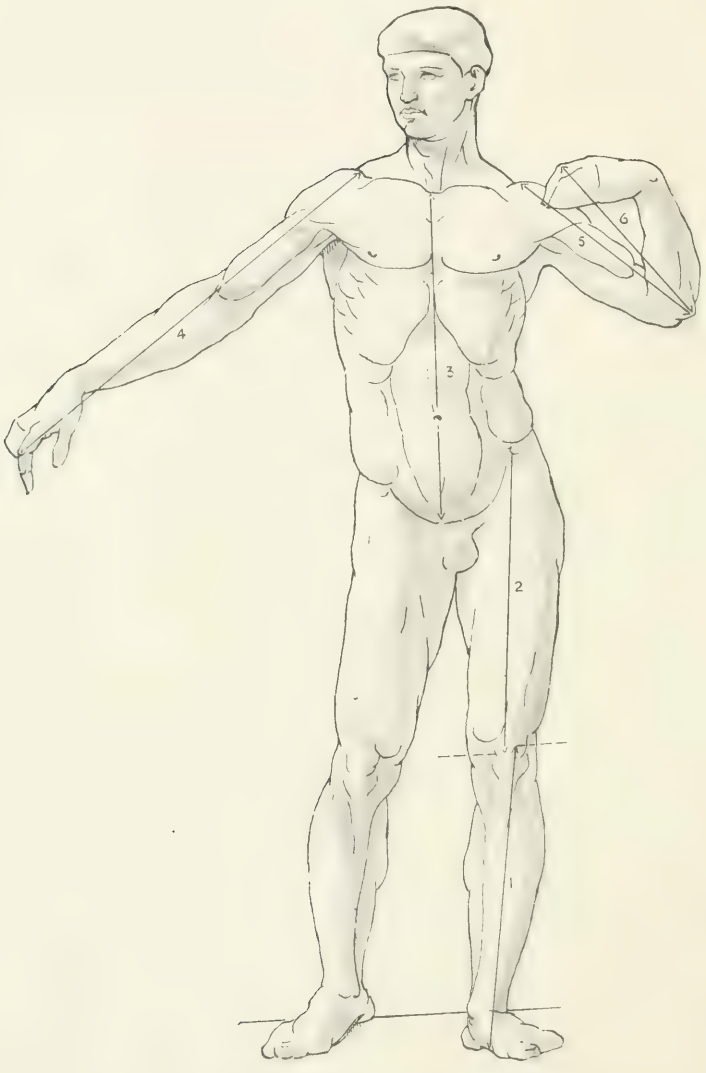

FIG. 129.—GENERAL COMPARATIVE PROPORTIONS.

1. From Plinth to top of Patella.
2. From centre of Patella to Iliac process.
3. From Pubic line to top of Sternum.

These three proportions are generally equal.

THE ARM.

4. Three heads in length from Acromion to first articulation of index finger.
5. From Acromion to head of Ulna one head and a half.
6. From head of Ulna to first articulation of finger one head and a half.

From Plinth to top of Patella two heads.

From centre of Patella to Iliac process two heads.

proportion from the ground to the top of the Patella was equal to the distance from the top of the Patella (instead of its centre) to the Anterior Superior process of the Ilium.

You will also find that this measurement from under the foot to the top of the Patella equals the distance from the supra-sternal notch to the line of the Pubes.

Generally speaking, these three measurements are the same.

Further: The length of the leg to the top of the Patella contains two heads, and the distance from the centre of the Patella to the Ilium the same.

Arm:—

In the outstretched arm, the measurement from the Acromion process to the first articulation of the Index contains three heads.

In a long arm the third head comes only to the middle of the first Phalanx.

There is, as a rule, one head and a half in the distance from the Acromion process, or Shoulder, to the head of the Ulna (the Elbow), and one head and a half from the Elbow to the end of the first of the Phalanges.

I think the knowledge of these few comparative proportions will be sufficient to prevent you from mistakes, when you have no model to guide you.

But to use, in your studies from life, other proportions than those presented by the model, would be quite contrary to all

idea of study; for all your attention must be engrossed by searching for the personal characteristics of your model. That is what *artistic study* means, and it is only by this kind of study that you will develop your powers of observation and lay in a store of knowledge to draw on for composition and design.

FIG. 130.

Fig. 131.

FIG. 132.

FIG. 133.

FIG. 134 [To face page 15]

Fig. 135.

FIG. 136. [To face page 136.

FIG. 137.

Fig. 138.

Fig. 139.

FIG. 140.

[*To face page* 137.

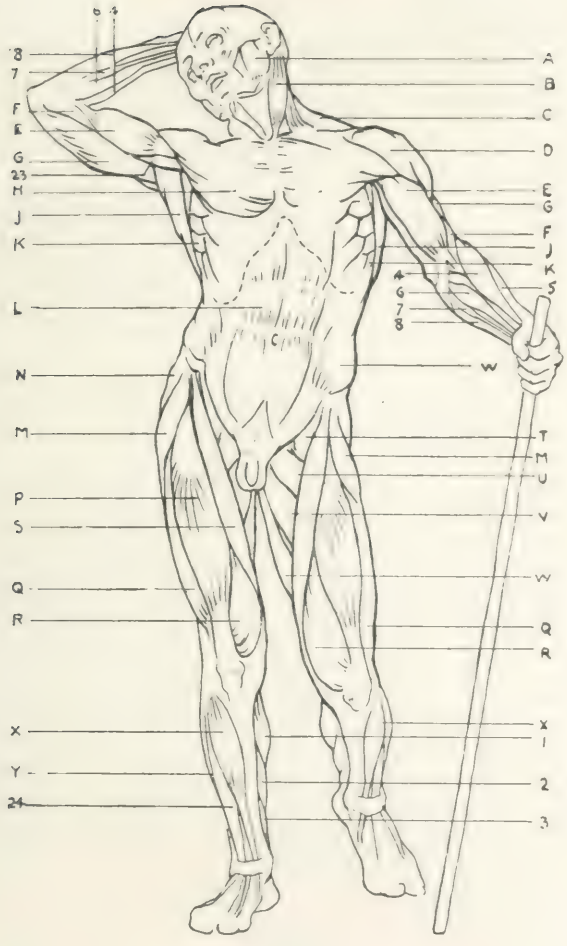

FIG. 141.

The numbers and letters refer to the same muscle in all four diagrams.

A. Masseter.
B. Sterno-cleido-mastoid.
C. Trapezius.
D. Deltoid.
E. Biceps.
F. Brachialis Anticus.
G. Triceps.
H. Pectoralis Major.
J. Latissimus Dorsi.
K. Serratus Magnus.
L Rectus Abdominis.
M. Tensor-Vaginæ-Femoris.

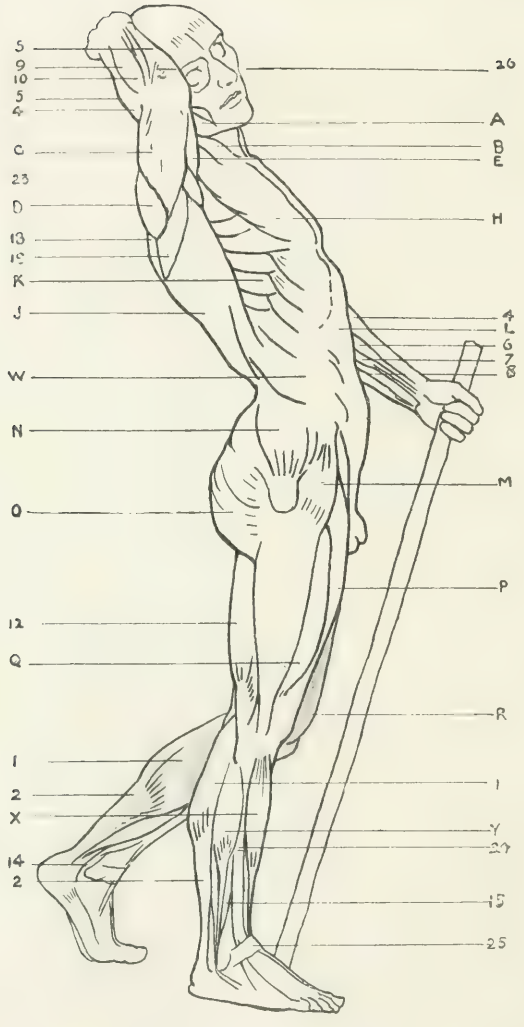

FIG. 142.

N. Gluteus Medius.
O. Gluteus Maximus.
P. Rectus Femoris.
Q. Vastus Externus.
R. Vastus Internus.
S. Sartorius.
T. Iliacus and Psoas.
U. Pectineus.
V. Adductor Longus.
W. External Oblique.
X. Tibialis Anticus.
Y. Peroneus Longus.

FIG. 143.

To face page 156

FIG. 144.

[*To face page* 139.

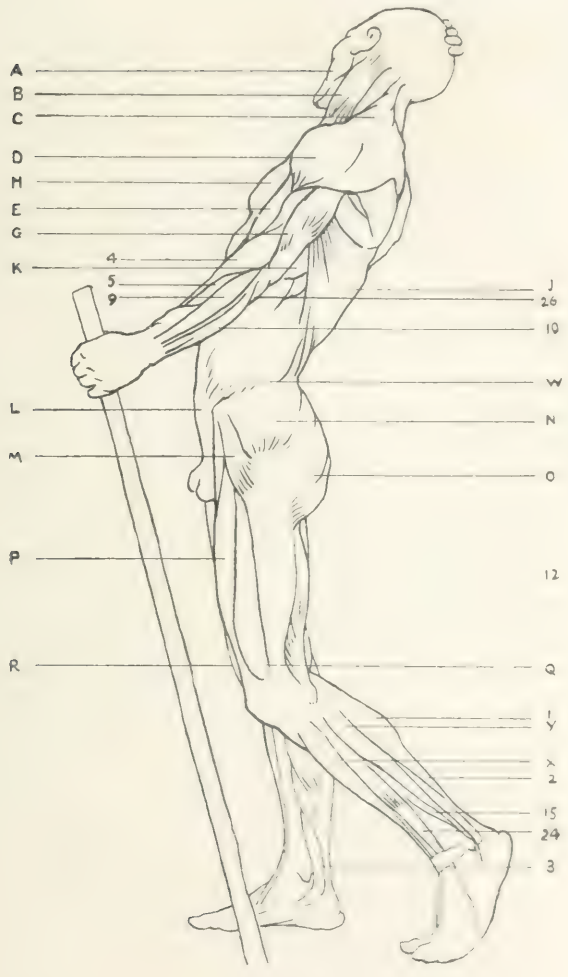

FIG. 145.

1. Gastrocnemius.
2. Soleus.
3. Long Flexor of the toes.
4. Supinator Longus.
5. Extensor-carpi-radialis-longior.
6. Flexor-carpi-radialis.
7. Palmaris Longus.
8. Flexor-carpi-ulnaris.
9. Extensor-communis Digitorum.
10. Extensor-carpi-ulnaris.
11. Semi-tendinosus.
12. Biceps Cruris.
13. Semi-membranosus.
14. Long Flexor of Great Toe.

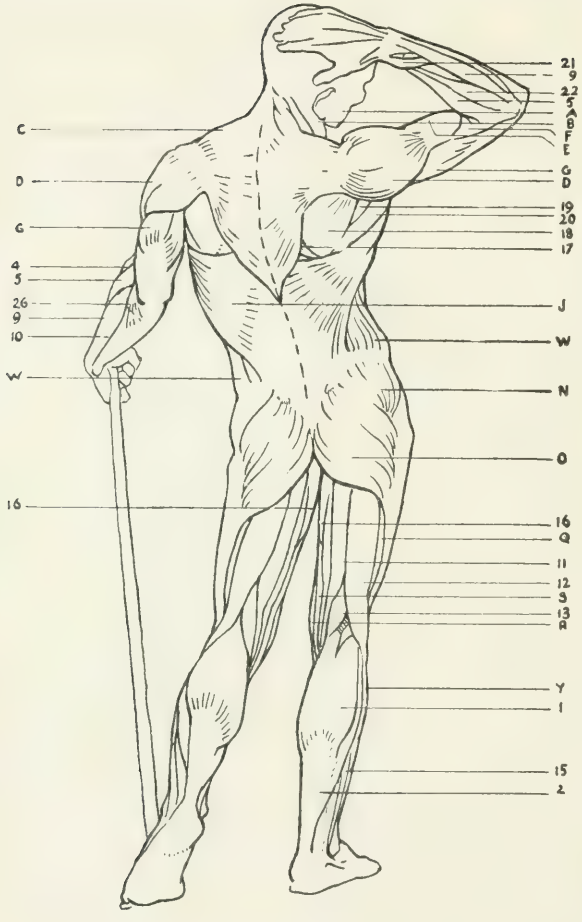

FIG. 146.

15 Peroneus Brevis.
16. Gracilis.
17. Rhomboideus Major.
18. Infra-spinatus.
19. Teres Minor.
20. Teres Major.
21. Extensor-ossis-metacarpi-pollicis.
22. Extensor-carpi-radialis-brevior.
23. Coraco-brachialis.
24. Long Extensor of the toes.
25. Anterior Annular Ligament.
26. Anconeus.

Fig. 147.

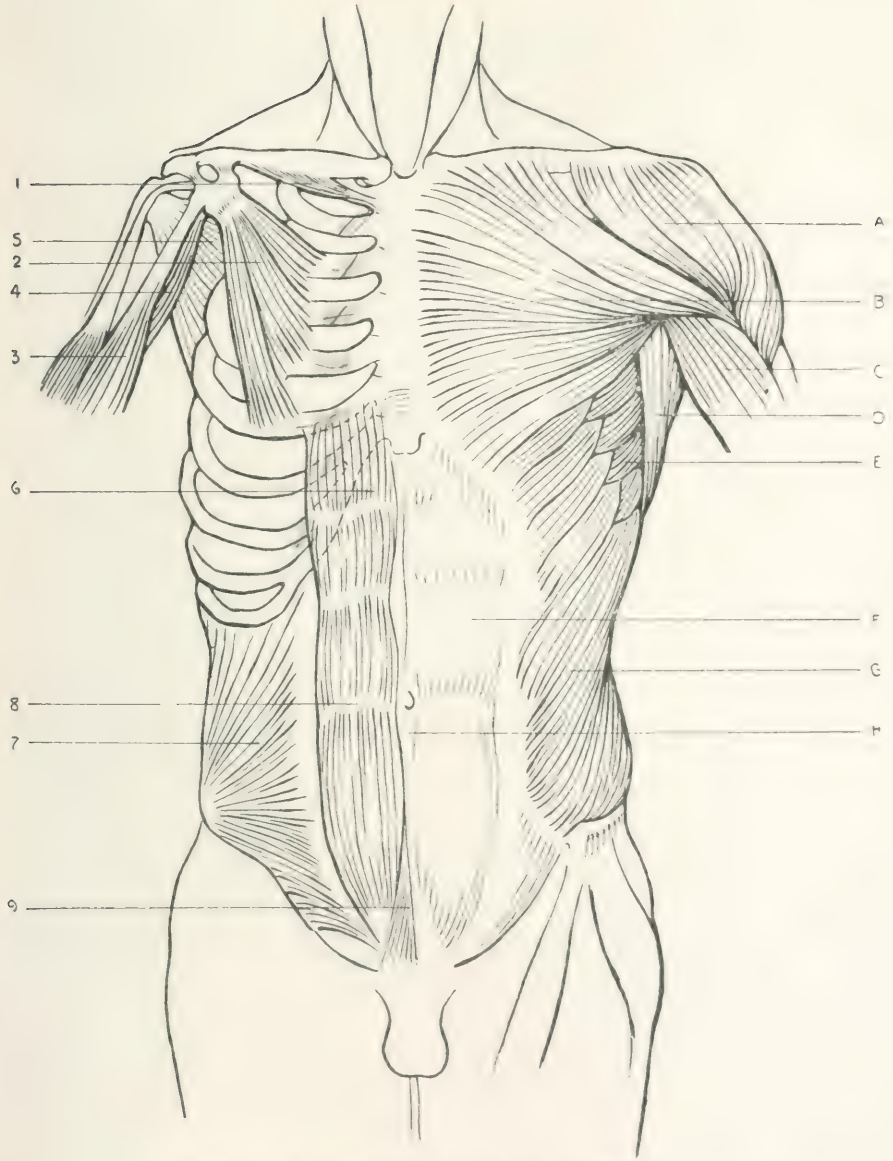

Fig. 148.—The Muscles of the Torso.

A. Deltoid.
B. Pectoralis Major.
C. Biceps.
D. Latissimus Dorsi.
E. Serratus Magnus.
F. Aponeurosis of External Oblique.
G. External Oblique.
H. Linea Alba.

Deep Portion.

1. Subclavius.
2. Pectoralis Minor.
3. Biceps.
4. Coraco-brachialis.
5. Subscapularis.
6. Rectus Abdominis.
7. Obliquus Internus Abdominis.
8. Lineæ Transversæ.
9. Pyramidalis.

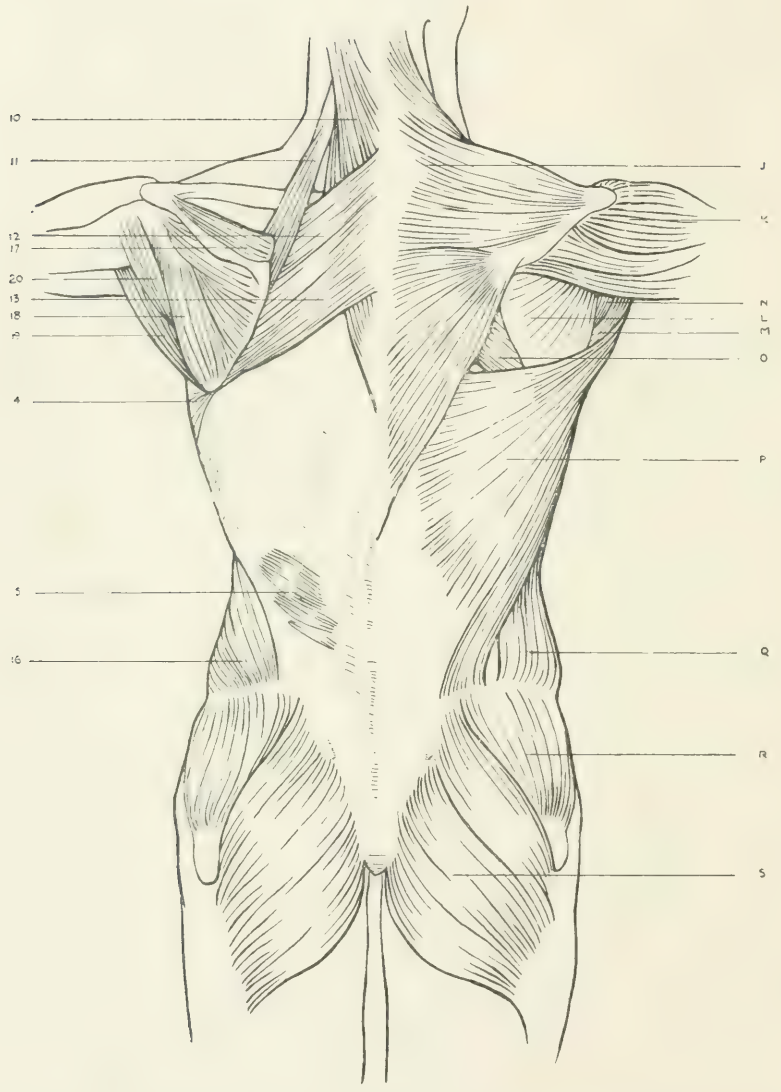

FIG. 149.—MUSCLES OF THE BACK OF THE TRUNK.

J. Trapezius.
K. Deltoid.
L. Infra-spinatus.
M. Teres Major.
N. Teres Minor.
O. Rhomboideus Major.
P. Latissimus Dorsi.
Q. External Oblique.
R. Gluteus Medius.
S. Gluteus Maximus.
T.

DEEP PORTION

10. Splenius.
11. Levator-anguli-scapulæ.
12. Rhomboideus Minor.
13. Rhomboideus Major.
14. Serratus Magnus.
15. Serratus Posticus Inferior.
16. Obliquus Internus.
17. Supra-spinatus.
18. Infra-spinatus.
19. Teres Major.
20. Teres Minor.

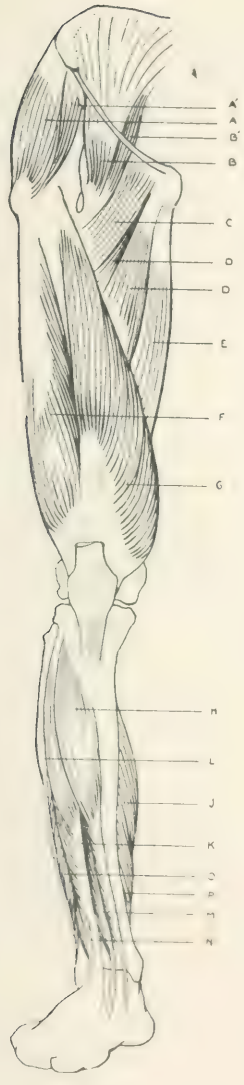

FIG. 150.

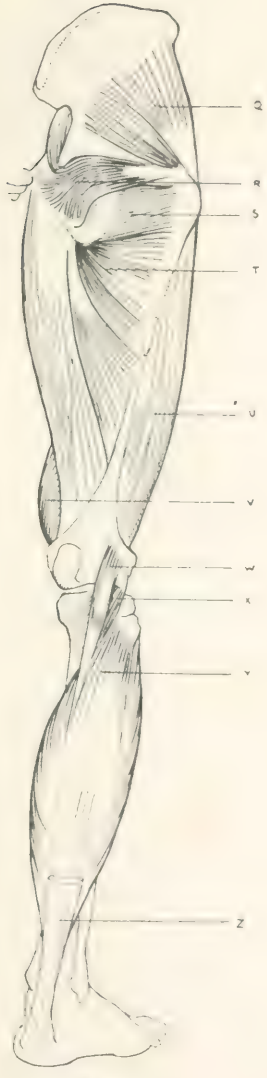

FIG. 151.

MUSCLES OF THE LEG.

A A'. Gluteus Medius and Maximus.
B B'. Iliacus and Psoas.
C. Pectineus.
D D'. Adductor Longus and Adductor Brevis.
E. Adductor Magnus.
F. Vastus Externus.
G. Vastus Internus.
H. Tibialis Anticus.
J. Soleus.
K. Extensor-longus Digitorum.
L. Peroneus Longus.
M. Extensor-propius-pollicis.
N. Peroneus Tertius or Anticus.
O. Peroneus Brevis.
P. Flexor-longus Digitorum.
Q. Gluteus Minimus.
R. Obturator Internus.
S. Quadratus Femoris.
T. Adductor Magnus.
U. Vastus Externus.
V. Vastus Internus.
W. Plantaris.
X. Popliteus.
Y. Soleus.
Z. Tendo Achilles.

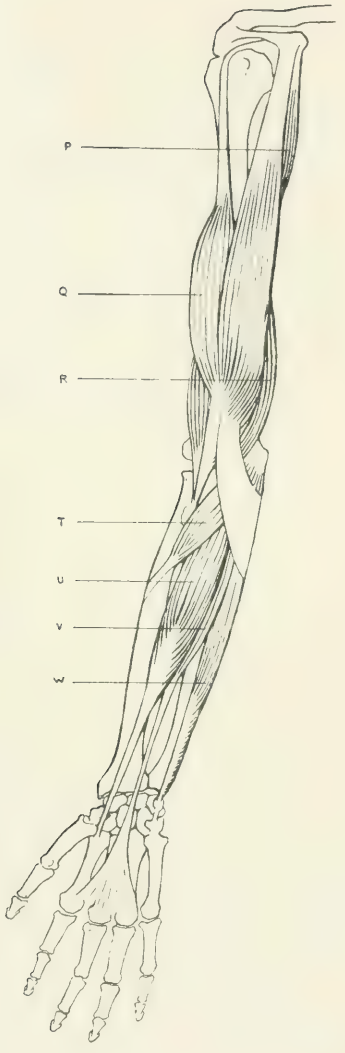

Fig. 152.

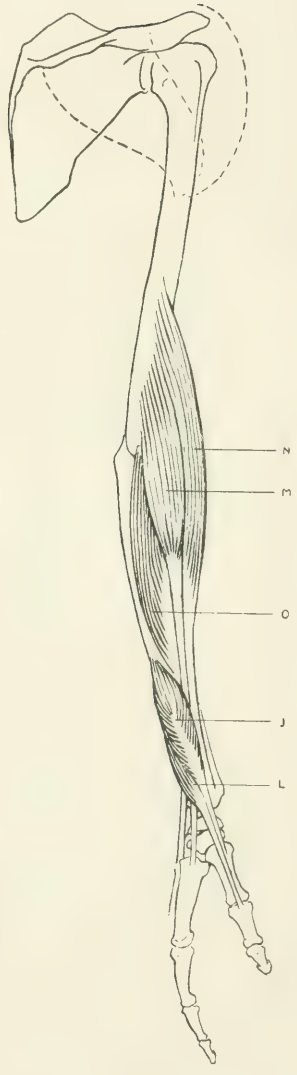

Fig. 153.

Muscles of the Arm.

J. Extensor-ossis-metacarpi-pollicis.
K.
L. Extensor-secundi-internodii-pollicis.
M. Extensor-carpi-radialis-longior.
N. Spinator-radii-longus.
O. Extensor-carpi-radialis-brevior.
P. Coraco-brachialis.
Q. Biceps Cubiti.
R. Brachialis Anticus.
S.
T. Pronator-radii-teres.
U. Flexor-carpi-radialis.
V. Palmaris Longus.
W. Flexor-carpi-ulnaris.

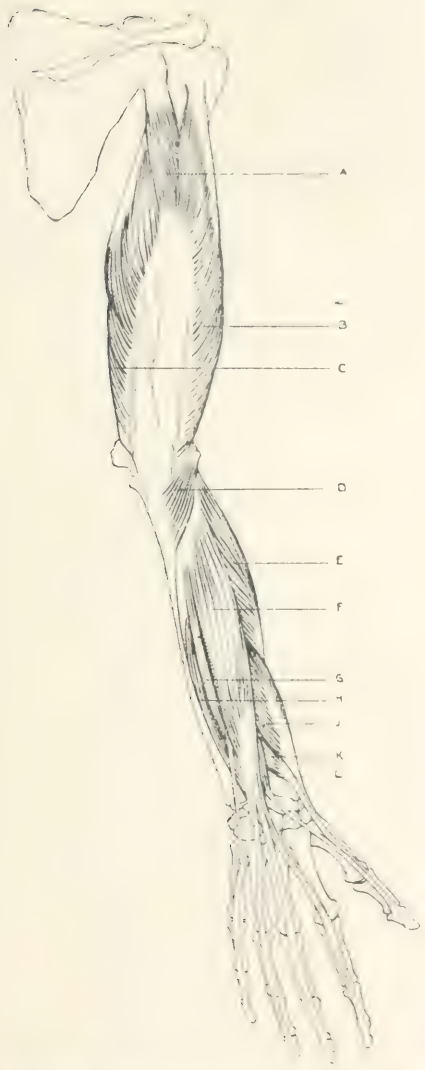

FIG. 154. MUSCLES OF THE ARM.

A. Triceps.
B. Triceps.
C. Triceps.
D. Anconeus.
E. Supinator-radii-brevis.
F. Extensor-communis Digitorum.
G. Extensor-minimi-digiti.
H. Extensor-indicis.
J. Extensor-ossis-metacarpi-pollicis.
K. Extensor-primi-internodii-pollicis.
L. Extensor-secundi-internodii-pollicis.

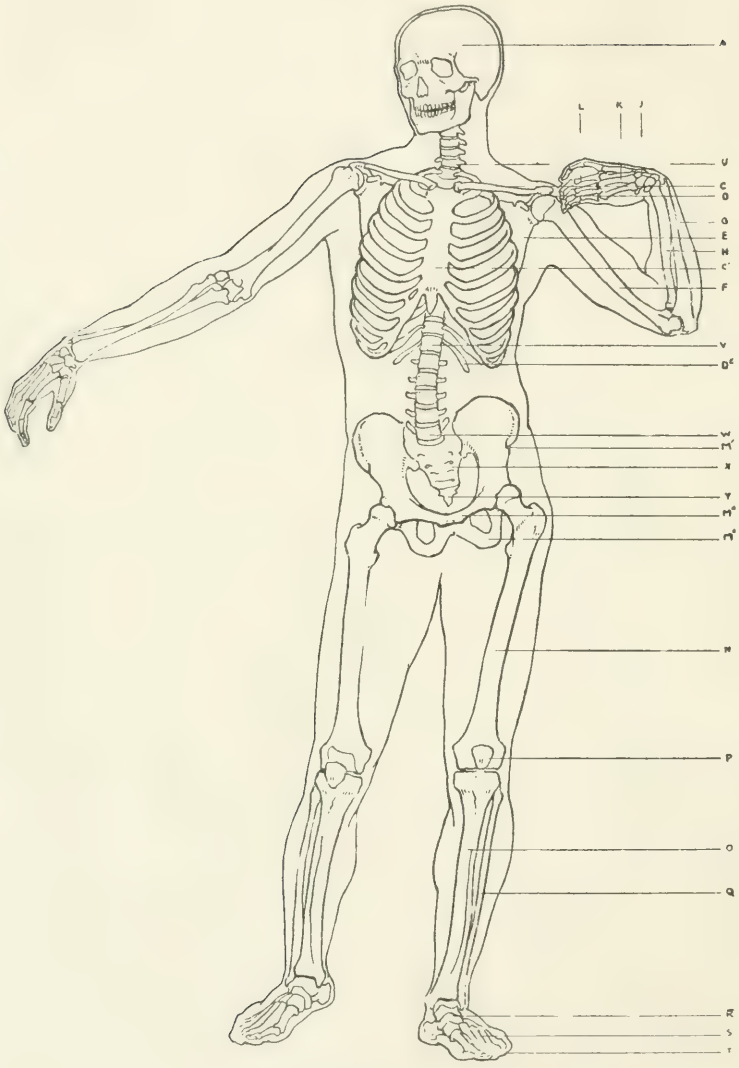

FIG. 155.—THE BONES.

The letters refer to the same bones in all these diagrams.

A. Skull.
B. Hyoid Bone.
C. Clavicle.
C′. Sternum.
D. Ribs. D^1, first Rib; D^{12}, twelfth Rib.
E. Scapula.

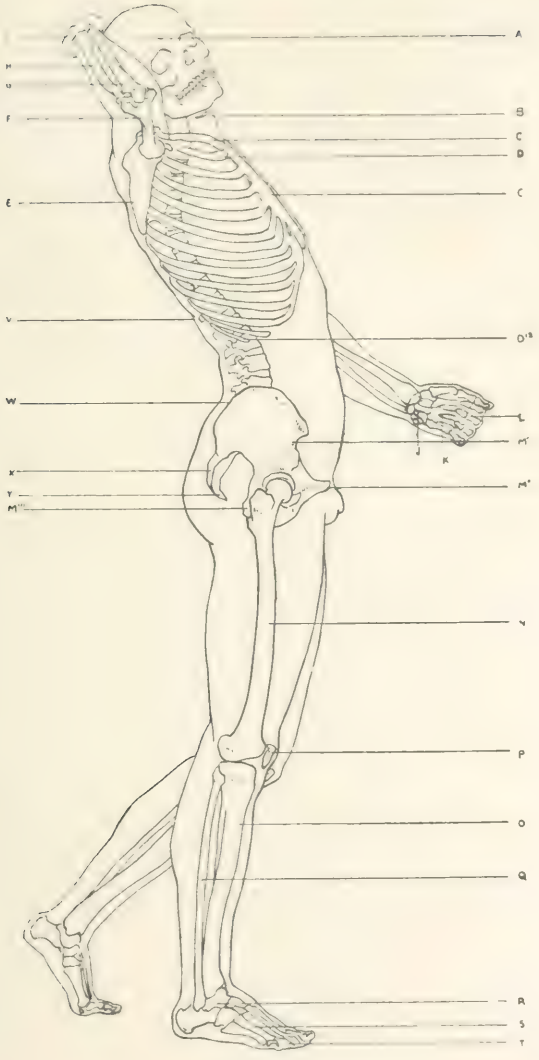

FIG. 156.

F. Humerus.
G. Ulna.
H. Radius.
J. Carpus.
K. Metacarpus.
L. Phalanges.
M. Innominata. M'. Ilium; M''. Pubis; M'''. Ischium.
N. Femur.
O. Tibia.
P. Patella.

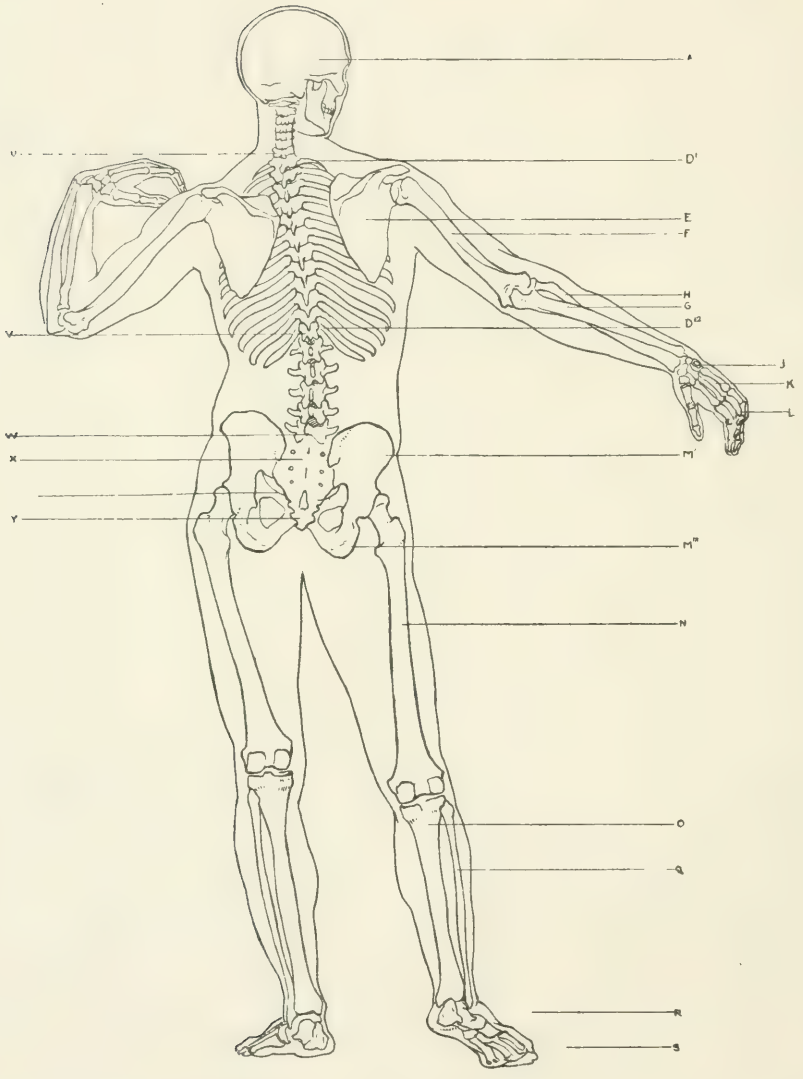

FIG. 157.

Q. Fibula.
R. Tarsus.
S. Metatarsus.
T. Phalanges.
U. 7th Cervical.
V. 12th Dorsal.
W. 5th Lumbar.
X. Sacrum.
Y. Coccyx.

ATTACHMENTS OF THE MUSCLES

MUSCLE	ATTACHMENTS
A. *Masseter.*	1st. Inferior margin of zygomatic arch.
	2nd. External surface of the ramus and the angle of the lower jaw-bone.
B. *Sterno-cleido-mastoid-eus.*	1st. Mastoid process of temporal bone, and backwards some distance along the superior curved line of the occipital bone.
	2nd. By the inner head to the front of top of sternum, and by the clavicular head to inner third of upper border of clavicle.
C. *Trapezius.*	1st. Spines of all dorsal vertebræ and last cervical; ligamentum nuchæ, from last cervical vertebra to occipital protuberance, and one-third of superior curved line of the occiput.
	2nd. Outer third hinder border of the clavicle, inner border of the acromion, upper border of spinous process of the scapula.
D. *Deltoid.*	1st. Spinous process of scapula and outer third of clavicle.
	2nd. Deltoid impression on the humerus.
E. *Biceps.*	1st. By the long head above glenoid cavity, by short head to coracoid process of scapula.
	2nd. By a long tendon to back of bicipital tuberosity of radius.
F. *Brachialis Anticus.*	1st. Lower half of anterior surface of humerus.
	2nd. Below coronoid process of ulna.

MUSCLE	ATTACHMENTS
G. *Triceps.*	1st. By the middle head, beneath glenoid cavity on neck of scapula; by the outer head, to outer side of upper half of humerus; by the inner head, to inner side and lower half of the humerus.
	2nd. Upper border and sides of the olecranon process of the ulna.
H. *Pectoralis Major.*	1st. Aponeurosis of the external oblique muscle of the abdomen, front of body, to hilt of sternum, and adjacent costal cartilages, to inner half of clavicle.
	2nd. Bicipital groove of humerus.
I. *Latissimus Dorsi.*	1st. By an aponeurosis to the lower six dorsal spines, to all the lumbar, upper two or three sacral spines; also to the posterior third of the iliac crest, and lowest three or four ribs.
	2nd. Bicipital groove of the humerus.
K. *Serratus Magnus.*	1st. Upper eight ribs.
	2nd. Base of the scapula.
L. *Rectus Abdominis.*	1st. Pubic crest and symphysis.
	2nd. Fifth rib, fifth, sixth, and seventh costal cartilages, and xiphoid cartilage.
M. *Tensor Vaginæ Femoris*	1st. Anterior superior iliac spine, and a small surface on the outer lip of the crest of the ilium.
	2nd. Fascia-lata.
N. *Gluteus Medius.*	1st. Upper part of outer surface of ilium.
	2nd. Outer surface of trochanter major.
O. *Gluteus Maximus.*	1st. Lower border of sacrum and coccyx and adjacent portion of ilium.
	2nd. Over trochanter to fascia and back of femur below trochanter.
P. *Rectus Femoris.*	1st. Anterior inferior iliac spine and above acetabulum.
	2nd. By common tendon to the patella.

MUSCLE	ATTACHMENTS
Q. *Vastus Externus.*	1st. Outer side of back of femur.
	2nd. Common tendon to the patella.
R. *Vastus Internus.*	1st. Inner side of back of femur.
	2nd. Common tendon to the patella.
S. *Sartorius.*	1st. Anterior superior iliac spine.
	2nd. Inner side of front of tibia.
T. *Iliacus and Psoas.*	1st. Iliac fossa and crest, base of the sacrum, capsule of hip joint, also twelfth dorsal and the five lumbar vertebræ.
	2nd. Trochanter minor.
U. *Pectineus.*	1st. Spine and crest of Os Pubis.
	2nd. Behind trochanter minor on the shaft of the femur.
V. *Adductor Longus.*	1st. Os Pubis (by a narrow flat tendon).
	2nd. Middle third of back of femur.
W. *External Oblique.*	1st. By digitations with the Latissimus Dorsi and Serratus Magnus, to lowest eight ribs.
	2nd. To the anterior half of the iliac crest and abdominal aponeurosis.
X. *Tibialis Anticus.*	1st. Upper half of outer surface and outer tuberosity of tibia.
	2nd. Inner and under side of cuneiform and first metatarsal bone.
Y. *Peroneus Longus.*	1st. Upper half and head of fibula.
	2nd. Under side of metatarsal bone of great toe.
1. *Gastrocnemius.*	1st. By two heads to back of condyles of femur.
	2nd. Back of Os Calcis by the tendo Achilles.
2. *Soleus.*	1st. Back of head of fibula and part of upper fourth of tibia and fibula.
	2nd. Back of Os Calcis.
3. *Long Flexor of the Toes.*	1st. Back of tibia below soleus.
	2nd. Third phalanx of four outer toes.
4. *Supinator Longus.*	1st. Upper part of epicondyloid ridge of humerus.
	2nd. Base of styloid process of radius.

MUSCLES	ATTACHMENTS	
5. *Extensor carpi radialis longior.*	1st.	Lower part of epicondyloid ridge of humerus.
	2nd.	Base of metacarpal bone of first finger.
6. *Flexor carpi radialis.*	1st.	Inner condyle of humerus, fascia of fore-arm.
	2nd.	Front of the base of metacarpal bone of fore finger.
7. *Palmaris Longus.*	1st.	Inner condyle of the humerus fascia of fore-arm.
	2nd.	Palmar fascia opposite the middle of the wrist.
8 *Flexor carpi ulnaris.*	1st.	Inner condyle of the humerus, inner side of olecranon, and upper two-thirds of posterior border of ulna.
	2nd.	Pisiform bone, annular ligament, and palmar fascia.
9. *Extensor communis digitorum.*	1st.	External condyle of the humerus.
	2nd.	By four tendons to the back of the bases of last two bones of the fingers.
10. *Extensor carpi ulnaris.*	1st.	External condyle of humerus.
	2nd.	Back of base of fifth metacarpal bone.
11. *Semi-Tendinosus.*	1st.	Back of tuberosity of ischium.
	2nd.	Inner side of front of tibia.
12. *Biceps Cruris.*	1st.	By long head, back of tuberosity of ischium; by short head, lower two-thirds of back of femur down to the external condyle.
	2nd.	Head of fibula.
13. *Semi-Membranosus.*	1st.	Back of tuberosity of ischium.
	2nd.	Back of internal tuberosity of tibia.
14. *Long Flexor of Great Toe.*	1st.	Back of fibula below soleus.
	2nd.	Under side of base of last phalanx of great toe.
15. *Peroneus Brevis.*	1st.	Outer side of fibula below Peroneus longus.
	2nd.	Tuberosity of fifth metatarsal bone.
16. *Gracilis.*	1st.	Os Pubis (descending ramus).
	2nd.	Inner side of tibia beneath internal tuberosity.

MUSCLES	ATTACHMENTS
17. *Rhomboideus Major.*	1st. Upper five dorsal spines. 2nd. Base of scapula from root of spine to lower angle.
18. *Infra-Spinatus.*	1st. Inner two-thirds of infra-spinous fossa. 2nd. Greater tuberosity of humerus.
19. *Teres Minor.*	1st. Upper two-thirds anterior border of scapula. 2nd. Greater tuberosity of humerus.
20. *Teres Major.*	1st. Inferior angle of scapula, axillary margin of the bone. 2nd. Bicipital groove of the humerus.
21. *Extensor ossis metacarpi pollicis.*	1st. Back of ulna, back of radius. 2nd. Back of metacarpal bone of thumb.
22. *Extensor carpi radialis brevior.*	1st. External condyle of the humerus. 2nd. Base of metacarpal bone of second finger.
23. *Coraco-brachialis.*	1st. Coracoid process of scapula. 2nd. Ridge in middle of inner side of humerus.
24. *Long Extensor of the Toes.*	1st. External tuberosity of tibia, upper part of inner surface of fibula. 2nd. Last phalanges of four outer toes.
25. *Anterior Annular Ligament.*	Consists of two bands : the upper placed vertically in the leg above the ankle joint ; the lower is placed obliquely across the highest part of the tarsus ; together they contain the tendons of the tibialis anticus, long extensor of the toes, peroneus tertius, and extensor of the great toe, in a sheath.
26. *Anconeus.*	1st. Back of external condyle of humerus. 2nd. Outer side of ulna below the olecranon process.

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